

THE PSYCHOLOGICAL REVIEW.

A PLEA FOR SOUL-SUBSTANCE. (I.)

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I.

De Anima, an Anima Sit.

Modern philosophy, both empirical and transcendental, has manifested a growing hostility toward all doctrines may be labelled 'scholastic.' Substance in general and soul-substance in particular are concepts that are peculiarly and essentially scholastic, and as such they have fallen into pretty general discredit with the thinkers of this century. Herbart and a few others have, indeed, favored the hypothesis of the 'something I know not what' as the basis and support of our mental life, but these defenders are few and their theories of the soul have not greatly influenced the psychology of to-day. Indeed, it is just the very question of 'how to get along without substance' about which all the tendencies of modern speculative philosophy may be said to center. Pre-Kantian and ancient thought accepts the conception of substance; modern thought rejects it; and philosophy, since Hume and Kant, can be understood as a series of efforts to explain phenomena without referring them to substance or substances. In the place of the indefinite something called substance Kant put the definite nothing, or *ding an sich*, leaving, as the only tangible subject matter of metaphysics, phenomena and the laws of phenomena, Content and Form. Given these two categories as the data of speculation, the question naturally arises as to which of the two is to be regarded as primary. Is it form or relation-stuff, or, on the other hand, is it content or sensation-stuff in terms of which experience is

to be described? The answers to this question are to be found in the two schools or tendencies of apriorism and empiricism. Both apriorist and empiricist are united in repudiating the notion of substance, and both join in attacking materialism and agnosticism, or, indeed, any doctrine which does not bow down to the all-sufficiency of the two categories of form and content.

This attitude of philosophy is thoroughly in keeping with the spirit of the age, recognizing, as it does, the importance of utility and economy alike in the conceptional as in all other spheres of action. For note: Spinoza found that he can get along with one substance instead of two; Kant reduces substance to shadow, while his successors, with a still greater ardor for conceptual economy, attempt to do without even the shadowy *ding an sich*. "Give us form and content, or even pure form alone, and we can deduce or *explain* everything," cry the post-Kantian idealists.

"Give us content and form, or content and the *fictions due to habit* (which latter are themselves mere facts or phenomena), and we can unify or *describe* everything," cry Hume and his disciples—each school endeavoring to economize by doing without some conception deemed necessary by a preceding school, and each justifying its omissions on the ground of the *inutility* of the discarded category. As a consequence of this wise frugality we find that the modern as distinguished from the ancient criterion for accepting or rejecting a new hypothesis consists wholly in the utility or non-utility of the proposed conception, and not in its inherent rationality or irrationality.

Since this is so, it is fitting that in attempting to reinstate the conception of a substantial soul we should begin by assuring ourselves that there exists a genuine need for some such conception. Are we able to explain mental phenomena without the hypothesis of soul? is this hypothesis of any *use* to philosophy or psychology? Now the various departments of philosophy have all shown their eagerness to answer in the negative. "The soul monad is not what morality and religion demand. It is not required by metaphysics or epistemology." But psychology, in particular, has outstripped the other philosophical sciences in the vigor and frankness with

which it denies and repudiates the existence of soul-substance. We have in fine the gladly acknowledged paradox of a 'psychology without a soul.' There are, it is true, no end of substitutes for the old substantial soul, 'formal unities,' 'concrete totals of experience,' 'unique centers of perception and activity,' besides all sorts of 'Egos' transcendental and otherwise; but no one of these has either the virtues or the vices of the mediæval soul-substance.

Since it is in psychology that the complete uselessness of the soul is supposed to have been most clearly demonstrated, it will be well for us to undertake our task from the psychological standpoint rather than from any other. We begin then by indicating the facts which would seem to us to necessitate the acceptance of the theory of soul-substance as a *sine qua non* of modern scientific psychology.

Psychology has for its subject matter states of consciousness as such, *i. e.*, thoughts, sensations, feelings, etc., considered as 'facts' and not as 'values'—mental content viewed apart from its normative worth. The same phenomena of consciousness which, when treated from the point of view of worth or conformity to ideals, make the subject matter of the *normative* sciences of Logic, Ethics and Æsthetics, when treated merely as facts form the subject matter of the *descriptive* science of Psychology. It is for this reason that psychology occupies a unique position among the sciences. It is, or at least it ought to be, a strictly descriptive science; at the same time all its data have a normative aspect. As a descriptive science it is bound to repudiate final causes and to recognize only efficient causes; and yet there are scarcely any mental sequences which can be understood apart from teleological—*i. e.*, normative or unpsychological considerations. Take, for example, the following mental sequence

$$\begin{array}{ccc} \alpha & \beta & \gamma \\ \sim & \sim & \sim \\ a=b, & b=c & \therefore a=c \end{array}$$

Considered teleologically the *causal law* of this sequence is obvious; but the same sequence considered psychologically is

by no means so easy to deal with. The Law of Identity or the *dictum de omni* can have no direct meaning for psychology, and so when we seek the cause of the inevitable succession of the mental state γ upon the preceding states α and β we are in a quandary, and are apt to explain the sequence on some such grounds as the possession by the individual thinker of certain organic dispositions, certain brain conditions which respond with mechanical necessity to particular stimuli. In short, we are in duty bound to suggest any explanation whatever, no matter how complicated, so long as it be not the natural explanation of the teleological Law of Identity operating on a rational mind. It must once for all be understood that every fact, mental as well as physical, has an *efficient* cause; and it is the business of all descriptive sciences to seek out these efficient causes by the method of Induction. The flowers are what they are, not because of the delight which they give, but simply because of certain material conditions, to ascertain the nature of which is the business of the descriptive science called botany. The *final* cause is quite outside the world of facts, and never, except indirectly, is it of the least use in scientific explanation.

The mental world offers the spectacle of a seeming conformity to teleological norms; indeed so strongly is this evidenced that when, after a long train of reasoning, we, as psychologists, are forced to say that the various rational ideals by which our reasoning has been governed are absolutely and utterly ineffective, and that not one single act can be said to have its true cause in any rational consideration; when I say we are forced to acknowledge this, we seem to ourselves to commit an absurdity, the absurdity namely of endeavoring to make mental phenomena amenable to the canons of descriptive science. What indeed remains to psychology if final causes are banished? How few and of what a low order are those mental sequences in which we can get even the smallest glimpse of the mechanical or efficient causes which are to explain them? While on the other hand, it is equally true that if we do *not* give up final causes, we admit the impossibility of a *science* of psychology. To say that a final cause can in itself be a *vera causa* in producing any effect in the world of phenomena is, from the point

of view of the modern scientist, exactly the same as talking about noisy triangles or yellow lies. The two spheres of mechanism and finality of 'fact' and 'value,' of 'description' and 'appreciation,' of 'Madam How' and 'Lady Why,' are and ought to be separated with genuine Cartesian rigor.

Now grant all this, and we can see at once that the psychologist has upon his hands a first-rate mystery of the highest order—the great and ever-present mystery of

THE SEEMING EFFICACY OF FINAL CAUSES IN THE WORLD OF MENTAL FACTS.¹

The existence of this mystery cannot be doubted, and the need of its solution is so pressing that until this need is satisfied the psychologist has no right to dignify his study by the name 'science.'

The methods of solving this mystery are five. In the first place, we may hold that it is the efficient causes which are fictitious, and that final causes rule the world and the details of the world that everything happens because of its fulfilling some rational end and for no other reason whatever. Teleology of this extreme type is, indeed, logically conceivable as a means of explaining the seeming communication of the two worlds; but inasmuch as this theory precludes not only descriptive psychology, but any descriptive science whatsoever—*i. e.*, any science which seeks for the how of a process rather than for its possible why—it may here be passed over.

The remaining four methods of grappling with our problem are the several doctrines of 'materialism,' 'occasionalism,' 'parallelism' and 'spiritualism.'

Just as the theory of absolute teleology mentioned above is possible only if science is abandoned altogether, so its counterpart materialism is incompatible with a belief in the *meaning* or *significance* of any phase of experience. Take, for example, the case of a sequence of psychical states culminating in a rational 'conclusion': just so soon as we deny that the conclusion

¹This puzzling phenomenon of the apparent interaction of two totally incommensurate orders of experience is, of course, not confined to psychology, but it is nowhere else evidenced with such unambiguous clearness.

was reached because of any logical significance or teleological reference contained in the premises—and this denial we as materialists are bound to make—then indeed the meaning of the conclusion—*i. e.*, the conclusion itself—has simply vanished.

In $a = b$, $b = c$: therefore $a = c$, to a really consistent materialist the 'therefore' which precedes the conclusion is out of place. It is not because a and c are both equal to b that they are equal to each other, but because the psychophysical nature of the individual who thinks the sequence happened to be so constructed that the mental states $a = b$, $b = c$, $a = c$, succeeded one another with mechanical necessity. But if the conclusion $a = c$ is due to mechanical causes, and in no sense to the law of identity, then all meaning is gone from the syllogism. In short, materialism contains its own disproof in that a rational demonstration of the materialistic thesis would be inconsistent with a view which denies significance to final causes; for any rational demonstration depends for its validity on final causes—that is, on teleological rather than mechanical consideration.

Leaving these two extreme methods of accounting for the seeming efficacy of final causes, we come to the remaining three doctrines, which in their several ways endeavor to compromise the matter. Let us begin by considering the theory of Occasionalism.

The advocate of occasionalism grants the existence of both efficient and final causes, grants also the fundamental difference between them, and boldly asserts that notwithstanding the fact of incommensurability the two realms of mechanism and teleology, of matter and mind, do actually interpenetrate—by the aid of a miracle. Every time that the rational sequence of ideas is influenced by the material world, and every time that material events are made to conform to rational law, then is a miracle performed by God. Occasionalism has the merit of recognizing the three great truths which are the data of our problem:

1. The full significance of the separation of Finality from Mechanism.
2. The equally evident truth of the reality of both worlds.
3. The apparent influence which they occasionally exert upon each other.

Notwithstanding the credit due to occasionalism for its frank recognition of the difficulties of the problem, the theory itself is impossible as a serious doctrine, at least for contemporary thought. Not only have miracles gone out of fashion, but also the very notion of a miracle is entirely negative as a scientific explanation. The scientist rejects occasionalism and all kindred doctrines, not so much on account of their probable falsity, but rather on account of the certainty of their uselessness to science even if proved true. Occasionalism and a science of psychology are mutually exclusive, and to presuppose the miraculous—*i. e.*, inexplicable character of what is to be explained—is at best an unfruitful method of procedure. In view of all this we are justified in clearing the field of all hypotheses except those of Parallelism and Spiritualism.

The parallelist holds that mind and matter are two separate worlds parallel to one another, and that they never come in contact any more than do two plane parallel lines. As for the 'psychologist's mystery,'—*viz.*, the *apparent* contact of mind and matter—it is accounted for by an established harmony due either to a divine person or to natural evolution. This is the doctrine which in one form or another is the basis of whatever is best in modern psychology. Clearly formulated by Spinoza and Leibniz, it remained for Kant to establish it upon a sound epistemological basis.

The great scientific advantages of this theory of psychophysical parallelism are easily brought to light by comparing it with the three rival methods just treated. It resembles the absolute teleology of the first method in so far as it leaves to the world all its significance and meaning, but it differs from that method in not rejecting true scientific or mechanical explanation. And, again, it is quite as scientific as materialism without at the same time sacrificing all norms and ideals to a blind mechanical fate. While, thirdly, as compared with occasionalism, it is equally frank in recognizing the distinction between finality and mechanism, yet it substitutes for a series of miraculous acts on the part of the Deity a single miraculous construction of the universe, which is obviously a great gain in conceptual economy. Take, for example, the case already given: a syllogism contain-

ing universal truths is uttered by an individual man. The pure teleologist denies *in toto* the psychological or descriptive side of the process; while the materialist, if consistent, must deny that the conclusion was due to any rational or logical causation whatever. The occasionalist refers the mystery to a miraculous interference; but the *Parallelist* at once undertakes a dual investigation which has for its ends (1) a logical or normative explanation of the syllogism, and (2) a mechanical or descriptive account of the *how* of the process, *i. e.*, a statement of the psychophysical conditions existing in the organism of that particular individual which enabled the psychophysical event called the 'conclusion' to follow with mechanical necessity the psychophysical events called the 'premises.'

It needs, however, only the most casual glance to see the immeasurable superiority of parallelism as compared with the other methods. If parallelism is to yield to any rival hypothesis, certainly that hypothesis can only be the hypothesis of a soul-substance.

Let us now turn from the strong points of the parallelistic doctrine to some of the difficulties connected with the theory. In the first place, we are struck with the fact that parallelism, when taken seriously as the ultimate explanation of our problem, presents us with a universe which is extremely and disagreeably *artificial*. Parallelism in the theistic or Leibnizian form would have us believe that the Deity went to an infinite amount of apparently needless labor to get the atoms so arranged that they should be in exactly the right position in the brain of every future thinker or speaker to accompany mechanically his particular utterances and the complicated, because teleological, sequences of those utterances. It may, indeed, be urged against this objection that its cogency is purely emotional and not logical; and, furthermore, that it is no more than the objection to which any theory of preordination is exposed. Now it is true that the objection of artificiality is not a logical objection. It is, after all, a healthy common-sense bias in favor of simplicity, rather than a reasoned conviction of its truth, which leads us to look askance upon the possibility of the ultimate validity of any needlessly artificial hypothesis. And Leibniz's monadology, in

spite of, or perhaps because of, its wonderful ingenuity, is a doctrine which it is morally impossible to accept. We feel, indeed, that Leibniz himself, had he been the creator, might very well have overcome the difficulty of connecting mind and matter by copying from the clock-maker; but although we may believe that Leibniz, or, for that matter, any one of us, might have adopted this plan of creation, we know all the while that God did not and could not. And really to suppose that he did, is to take our own abstractions too seriously. Nor can it be urged that the preëstablished harmony is no more artificial than the common and reasonable notion of predestination, for the latter simply implies the divine authorship of a concrete world of souls, while the Leibnizian doctrine implies a divine fitting together of two human abstractions. But if we turn away from such peculiarly artificial anthropomorphism, we come at once to the other horn of the parallelists' dilemma, we have, namely, the task of giving a naturalistic in place of a supernaturalistic account of the origin of this wonderful harmony. Perhaps, as one psychologist has expressed it, we are justified for methodological purposes in regarding the atoms as *'having conspired together' to form combinations and sequences, which, although conducted entirely on the mechanical plan, shall yet fit in so nicely with the teleological world of mind as to appear to influence and be influenced by it.* There is perhaps no logical ground for rejecting this conceit. We cannot say that such a blind atomic conspiracy is infinitely improbable for the reason that the distinction between the probable and the improbable becomes meaningless when, all data being transcended, it is applied to the universe as a whole, Von Hartmann to the contrary notwithstanding. Nevertheless, despite the advantage of this theory as a working hypothesis, I must again fall back upon the ignoble refuge of common sense, and appeal to our emotional prejudice against such artificiality as is manifested in this account, as sufficient reason for rejecting it as an ultimate solution of the 'psychologist's mystery.'

Let us see, however, whether the modern doctrine of evolution can offer a less unsatisfactory method of explaining the genesis of a parallelistic world. Can it be shown that the

joining of mind and matter in the living organism is an aid in the struggle for existence? If so, we have a fairly reasonable theory, and a theory that is in harmony with the Darwinian spirit of the times. The seeming artificiality of the two previous types of parallelistic cosmogony is no longer a drawback to the theory itself, for we have the simple knowledge that parallelism is a 'survival of the fittest,' and that a psychophysical organism,—*i. e.*, a brain or nervous system—has outstripped both the purely physical and the purely psychical forms of existence. Now if this claim can be justified, parallelism has a very strong case. But can it be justified? Let us remember that mind and matter can never have influenced *one another*, for the very reason that they are parallel and incommensurate. There is a certain formation of matter, to wit, the brain, which happens to harmonize with thought—*i. e.*, to act as if it were affected by final causes; and, again, there is a certain kind of mind-stuff that acts as if it were influenced by physical causes. But if mind and matter are really parallel, if they never affect each other, how can the principle of natural selection aid us in accounting for the origin of their harmonizing in the living being? From the point of view of matter, consciousness must be regarded by the parallelist—as by Huxley—as an *epiphenomenon*, a phenomenon which is absolutely without effect in the material world. We are automata endowed with consciousness—*i. e.*, endowed with the power of looking on at the actions performed by our bodies. But if consciousness and matter *in general* are helpless to affect one another, it follows that *particular types* of consciousness and of matter (*e. g.*, a mind apparently conforming to mechanical laws or a brain apparently conforming to teleological laws) will be equally helpless to aid or to hinder the actions of their counterparts. If consciousness is a mere spectator, we may for a moment suppose it to be absent. What change would then result? No change at all. The world would proceed exactly as before; human bodies would walk and talk and go through all the multitude of apparently rational actions, and indeed, according to Huxley and the consistent parallelist, there would not be the slightest difference, from a factual standpoint, between our living world and a world

which was absolutely without life—a world which lacked the epiphenomenon of consciousness. To return then to the point at issue: we see that although a *brain* might very well be a survival of the fittest, the *joining of brain to consciousness* could never be such a survival without allowing—contrary to hypothesis—that consciousness is a true cause and not an epiphenomenon in the material world.

But supposing that we waive all the difficulties attending the naturalistic as well as the supernatural theories of the origin of parallelistic harmony; suppose, I say, that we waive all objections to the genetic side of the matter, and pass to a consideration of the logical consistency or possibility of this alleged harmony. We are told that mind and matter do not really influence one another, that they are parallel and that the causal law does not bind them together. Inductive science has furnished us with a grandly simple test, which is expressly meant to be applied to all such cases as this; we have only to use the three following rules in order to determine whether or not two things are causally united.

Let the two phenomena be *A* and *B*; then the rules may be expressed thus:

1. When *A* is absent *B* must be absent.
2. When *A* is present *B* must be present.
3. When *A* varies *B* must vary proportionately.

Now, if mind and matter should ever be found to fulfill these three conditions, would it not be a scientific duty to regard them not as parallel and sundered, but as reciprocally influenced by one another? As a matter of fact, we do find a class of cases which fulfill these three conditions, namely, all cases of individual life. And inasmuch as life, so far as we know, is never unindividualized, we are justified in saying that all life is an example, and the only example, of a causal relation between mind and matter—between the realms of teleology and mechanism. Whenever there is life then it holds true that

1. Absence or cessation of consciousness involves (or is invariably accompanied by) the absence of certain material conditions or brain processes; and conversely, when these brain processes are interrupted consciousness ceases.¹

¹ About the precise nature and location of these processes little is known, but of their existence there is no question.

2. Presence of consciousness implies the presence in the brain of the mentioned processes, and conversely.

3. Qualitative and intensive changes in consciousness imply and are implied by corresponding changes in the brain, which are respectively qualitative (*i. e.*, structural) or quantitative (*i. e.*, functional).

Must we not then admit that all life is an example of causality between mind and matter, and that when the parallelist denies this causality he repudiates the canons of inductive science? If it is really true that in life these two great orders of events—the mechanical and the teleological—fulfill all the conditions of reciprocal causality, it becomes a scientific impossibility to regard them as parallel solely because they appear to us incommensurate.

But suppose it be objected that this criticism is based upon a naïve misapprehension of the parallelistic thesis, the whole force of which depends upon the truth of the (purely apparent) causality between mind and matter which we as critics of parallelism have been at such pains to establish. I answer that the distinction between actual causality and the *illusion* of causality exists only when the conditions for inferring the causality are *imperfectly* fulfilled. When two things act *to some extent* as though they were causally related, then we may with propriety hold that the causality can be either seeming or real; but when *all* the conditions for a valid inference of cause are fulfilled then we can no longer entertain the possibility of a causality merely seeming the result, let us say, of a parallelism between the two events. In short, although parallelism might very well counterfeit a causality only *partly* verified, it would be impossible, or at least infinitely improbable, that a perfectly verified causality was the result of a parallelism, however elaborate, at least in a world in which there was any approach to what we call the 'uniformity of nature.' The truth of this can be seen by a brief examination into what it is that gives cogency to the third canon of inference stated above. When two events are observed to be present and absent together at once, there is a certain probability that they are causally connected; when they are observed as mutually present and absent on ten occasions,

we have a probability of their being causally connected which is ten times as great as the first; and so when they are present and absent together on an infinite number of occasions there is an infinite probability—*i. e.*, a certainty—of a real causal connection between them. Now any continuous quantity can be regarded as containing an infinite number of discrete quantities; and so a continuous variable—say, a curve—contains an infinite number of separate variations: hence when two continuously varying processes of events agree with each other throughout the probability that they stand in a causal relation is infinite and equivalent to certainty; and the third rule of inference is simply the *continuous* or infinitely repeated verification of the conditions of the first and second rules.

If, then, the canons of inference hold good, parallelism must be rejected.¹ Mind and matter do really influence one another wherever there is life; indeed life may be roughly defined as the single known condition for the existence of an order of events which is neither purely teleological nor purely mechanical, nor yet a harmonious parallelism of both, but rather a perfect interpenetration of mechanism and finality, of solid fact and airy meaning.

The fact of correspondence could, on account of the 'equationlessness' or complete lawlessness of the curves, never be referred to a parallelism—*i. e.*, to a prearrangement on the part of Nature or God—but only to a continuously operative causality. It is this latter type of connection that unites the mechanical and teleological orders of experience.

Notwithstanding the various objections which have so often been urged against psychophysical parallelism, the theory has taken such firm root and in such high places that I venture one more attempt to show the difficulty inherent in the conception.

¹Two phenomena or two sequences of phenomena which fulfilled only the first and second criteria of cause—which implied merely the presence and absence respectively of each other—might very well be parallel, and only *appear* to be causally related. They could be symbolized thus: $\begin{matrix} A & \text{---} \\ B & \text{---} \end{matrix}$. On the other hand, two sequences which in addition to the characters of the above pair exhibited the phenomenon of *concomitant variation*, could only be regarded as really causally connected; and they could be symbolized by two concomitant but infinitely variable or 'equationless' curves.

A mechanical world in so far as it is mechanical is a world of quantities; and a teleological world in so far as it is teleological is a world of qualities. The one is *continuous*, the other is *discrete*. Given any two pure quantities, and there is also given an infinite number of intermediate quantities; while, on the contrary, between any two pure qualities there is given no intermediate excepting the quite formal unity of the perceiving consciousness. Of course, we never get pure quantities in the physical world, nor pure qualities in the world of mind. The science of Mechanics cannot be reduced to geometry, because the discrete positions and masses of the moving bodies are just as important factors as the continuous distances through which they move. And analogously we can never reduce epistemology or logic to a completed system of mutually exclusive or absolutely discrete concepts or categories. It was this latter ideal which Hegel thought he had attained in his Logic; and the attempt to express all mental life as a dialectical product of the 'Idea and its Other,' of identity and difference is as grand and as impossible as the complementary attempt to express all material bodies as the product of a continuous space or continuous ether. Nevertheless, in spite of the failure to separate things into pure qualities and pure quantities, it remains true that qualities as such are related in only two ways, while quantities as such are related in an infinite number of ways. Any quality *A* has its formal opposite not-*A*, while of the quantities two only stand to each other as opposites, viz., zero and infinity; and the only way in which a quantity can be 'turned into its opposite' (without introducing any qualitative determinant, such as difference in sign) is by combining it with zero or infinity. To make a change in a quantitative system which should be adequate or parallel to a change in a qualitative system would involve an infinite increase or decrease of the energy or quantitative value of the system.

Take now the typical case of a qualitative change. I make the successive judgments: 'Man is mortal,' 'Man is not mortal.' The conceptional universes of consequences which follow respectively from each of these assertions are mutually exclusive—are qualitatively different. Now, according to the parallelist, there were two material systems accompanying these two men-

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tal systems, and when I changed from judgment number one to judgment number two, material system number one made a corresponding change and became material system number two. And as the two changes were parallel to one another, the measure of the change—*i. e.*, the ratio of the second state to the first—must be the same in both cases. Consequently the change in the material or quantitative universe must have been infinite, as otherwise the differences could not correspond with nor parallel one another. But surely it is preposterous to suppose that the physical world makes these tremendous jumps in quantity whenever any one divides a universe of discourse into *A* and not *A*. And yet if we leave it to itself, cut off from any causal connection with and yet exactly corresponding to the world of concepts, that is just what must happen. But, as a matter of fact, what does happen in the physical world when there is a change in the conceptional world? I say 'Man is mortal,' and a certain brain-state and consequently a certain modification of the entire material universe are present at the moment of my utterance. I now change the judgment to 'Man is not mortal,' and simultaneously the material universe changes also, but changes almost infinitesimally instead of infinitely. The addition of the word 'not' is accompanied by the tiniest and most insignificant of changes in the world of matter, although it completely reverses my conceptional universe. If, instead of the word '*not*,' I had put a nonsense syllable of three letters, the physical change would have been equally great, while the conceptional change would have been absolutely *nil*. Indeed, if we are to continue to hold to the parallelistic theory, we must once for all give up the idea that the energy of the effect varies quantitatively with the cause. The change from a brain state accompanying the rational affirmation of a judgment to the brain state accompanying its negation is primarily a qualitative change, and as such can only find its sufficient reason, its *vera causa* in the qualitative—*i. e.*, conceptional—change that occurs in the mind. In short brain-states, like all the other quantitative or continuously changing elements of the mechanical world, no matter how cunningly arranged by a Leibnizian god, would be of themselves infinitely lacking in the power to

keep up with the absolute or qualitative changes involved in reasoning.

Every one will grant that psychology has for its object matter a process that has a double aspect. Each psychical event is both a *fact* and a *meaning*. Must we not, however, go even further, and admit, on the strength of our criticism of parallelism, that psychical events do not have even these two aspects purely distinct? Neither the *fact*—*i. e.*, the actual presence of the feeling—on the one side, nor its *meaning* and significance on the other, are able to be understood apart from one another. There is no fact of consciousness which does not, even in its mere brute presence, imply some meaning; while, again, there is no meaning or judgment so universal and so thoroughly ideal that its utterance by an individual does not to some extent particularize or individualize it. In short, it is not only true that norms and facts influence one another, but each norm is itself to some degree tainted with fact; and conversely, each fact is *qua fact* to some degree dignified with an ideal significance. Mediateness and immediateness are, in spite of their opposed and incommensurate natures, matters of more and less.

But, one may well ask, What has all this to do with the conception of a substantial soul? Suppose all consciousness *is* a continuous sequence of events of such a nature that mechanical and teleological orders of existence persist both collectively and individually in exchanging salutations and in deferring to each other's laws; grant that this insufferable state of things exists, and that on account of it psychology is impossible for the simple reason that a psychological law could be nothing but a preposterous blending of physics and epistemology: does it therefore follow that we should add to the confusion occasioned from a mixture of two incommensurates by proceeding to introduce an unknowable *tertium quid*? Because matter and mind interfere with each other in consciousness, are we to invoke a substantial soul as an aid to comprehension? I answer, yes; it is logically necessary to call in a third thing, a thing, moreover, about which we know very little, precisely in order to explain this interpenetration of the material and the teleological which is the everyday mystery of consciousness. Our justification for this step is the following axiom:

When two things, A and B, are related to each other, there is implied by that relation the existence of a third thing or medium, X, whose nature is 'individual' or 'simple' and different from either, though homogeneous and commensurate with both.

When *A* and *B* are 'attributes' then *X* will be 'substance.' The paradox implied in the notion of substance is simply this—a substance (*X*) cannot be a phenomenon or attribute (*A*, *B*, *C*, ...); it cannot add to the qualitative content, to the 'whatness' of the object, and is, therefore, in one sense nothing; while on the other hand, inasmuch as the attributes or phenomena cannot exist or be understood in themselves, either singly or collectively, it follows that they must have their real being in a substance which underlies and connects them. To put the thing in the modern and expressive terminology of Mr. Bradley, every object is composed of a 'that' and an indefinite number of 'whats.' *What* the 'that' is we cannot easily say for the very reason that it is not, properly speaking, a 'what,' but a 'that'; it is the subject of which qualities can be predicated and which de facto is not itself an ordinary predicate. But it by no means follows; that the inherent difficulty of describing the 'that' justifies a denial of its existence. Each 'what' carries on its face its own inadequacy to stand alone or to explain its relations to its fellows; and the reality of the 'that'—the reality of substance—is not only given immediately in experience, but can be indirectly or mediately inferred by reflection upon the imperfection and unsubstantiality of the attributes.

Now mind by itself cannot explain matter nor matter explain mind; therefore the proved fact of their relation can only be understood by regarding them as attributes of a substance, a soul, whose nature if understood would explain their mysterious connection. As said above, the soul could be provisionally defined as "that which made final causes efficient in the material world; and conversely, as that which enabled efficient causes to produce teleological effects or meanings."

We have now, I think, set forth all the conditions of our problem and the negative or indirect reasons for solving that problem by the theory of soul-substances. From the outset we

have tacitly assumed that 'mind' and 'matter' were synonymous respectively with 'teleology' or 'finality' and 'mechanism' or 'efficiency'; the reasons for this assumption being the advisability of keeping clear of the issue between cosmological realism and idealism. All *esse* may be *percipi* or it may not; for our purposes the important thing was to distinguish between *percipi* which was mechanical and *percipi* which was *teleological*. Consequently the most ardent Berkeleyan would have no right to rebel against speaking of matter as real if the term matter were simply used as a generic term for all those events and sequences of events which conform to mechanical or factual as distinguished from teleological or normative laws.

After having pointed out the equal reality and mutual incommensurability of these two orders of experience, together with the indubitable fact of their *apparent* influence upon one another throughout the domain of life or consciousness, we next considered the five methods of solving this problem of a seeming relation between two incommensurates. These methods were:

1. Absolute teleology, which denies the existence of material or mechanical sequences.
2. Materialism, which denies the existence of mental or teleological sequences.
3. Occasionalism, which admits the reality of both mind and matter, but explains their interaction by a series of miracles.
4. Parallelism, a doctrine which, like occasionalism, admits matter and mind as realities, but explains their apparent interaction as an illusion produced by a naturally or supernaturally established harmony.
5. The theory of the soul—a theory which holds that mind and matter are the two real aspects or attributes of a single substance in virtue of which they can and actually do interpenetrate.

Thus far we have accomplished half of our appointed task: we have shown the inadequacy of the two attributes of mechanism and teleology to explain their own blending in the concrete sequences of consciousness; and we have, therefore, been driven to infer the existence of a *tertium quid*—a soul-substance—which so far has only been—*functionally* defined—*i. e.*, defined in terms of what it can do. It now remains to determine, so far

as possible, what the soul-substance is, and until this is done we have no right to distinguish the soul conceived as substance from the soul conceived as *ding an sich*. Indeed, the valid and positive notion of substance differs from the negative and useless notion of the thing-in-itself solely in virtue of its complete fulfillment of a set of requirements which are only partially fulfilled in the concept of a thing-in-itself. These requirements are three in number, and may be stated as follows:

1. A substance must, in order to be defined, possess an intelligible essence or character—a mode of its own—distinct from the attributes.

2. This 'substantial form,' or essence, must be related to all the attributes as genus to species.

3. And also to each attribute as species to genus.

The significance of these requirements may be best illustrated by observing what results if we omit any one of them. Suppose we omit the first requirement; we are left with the undefined that, the *ding an sich*. It is the genus of the attributes, because all qualities have the character of being presented or of existing; while, again, existence is itself a 'somewhat' different from any or all qualitative determinations. That which constitutes the difference between the hundred real and the hundred possible dollars is not to be denied, although it cannot be described. 'Existence' is then both genus and species; and to find the form of existence the 'whatness' of the 'thatness' would be all that was necessary to change the conception of the *ding an sich* into the conception of substance.

Suppose, however, that instead of omitting the first requirement we omit the second. We should then have in place of a generic substance simply an additional and merely specific attribute. If, for example, it is said that the soul is neither material nor ideal, we may know in advance that it can never explain as its logical derivatives the attributes of materiality and ideality. In excluding the attributes from its own ungeneric nature it excludes also the possibility of explaining the relation between them. It is the omission of this second requirement that marks the imperfection of such systems as that of Thales. Water is not the summum genus, consequently it cannot be the absolute substance.

Finally, if we attempt to get along without the third requirement; if we say that the soul is nothing but mind and matter; that it has no new quality, no differentia of its own—we have pure phenomenism or positivism, a doctrine which holds that the substance of a thing is merely the sum of its attributes. In short, to omit this third requirement is to give up the conception of substance altogether.

These three requirements for a valid or adequate conception of substance are implicitly recognized in all metaphysics; but in St. Thomas's conception of God and in Hegel's conception of the Begriff,¹ the recognition is clear and explicit, so much so that one might almost say that the problem of the Absolute appears for these thinkers as neither more nor less than the problem of substance as above defined.

We are now in a position to understand the nature of the last half of our task. Once having justified our right to believe in a soul-substance as existing, we must further proceed to define our *ding an sich*, to fill in the blank which is as yet only determined functionally—as an unknown locus of known relations. In a later paper I hope to show that the moral consciousness affords a valid and unique instance of what is required for the adequate definition of substance; and that in moral sequences we find a type of causality that is at once mechanical and teleological, while yet differing from both exactly as the common *limit* of two separate series differs from those series.

In this paper I have attempted only a demonstration of the existence of a genuine need for a soul-substance from the point of view of descriptive psychology, and a vindication of the right to hypostasize such a conception as soon as it shall be properly defined.

¹ See particularly Hegel's chapter on *Kraft und Verstand*, in his *Phänomenologie des Geistes*.

THE REACTION TIME OF THE EYE.

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The reaction time of the eye has an unique significance for the physiologist and the psychologist, partly on account of the peculiar half unconscious character of the eye movements and the consequent general bearing upon the problems of reaction, but more particularly because every change of direction of the line of *regard* is fundamentally an eye reaction.

For the proof of this proposition I am compelled to refer the reader to the original discussion,¹ where will be found as well the proof of the fact which makes it important, viz.: In every change in the point of regard in a complex field of vision the eye distinguishes nothing during the actual movement. That this statement seems to be contradicted many times daily suffices to explain how the erroneous conceptions of the eye movements could have remained unchallenged so long and how so many false interpretations could have clustered around them.

Important as these facts are for the general theory of physiological optics, they have as well a very interesting bearing on the physiology of the eye in reading, whose problems gave the first cue to their discovery. On the one hand, they explain the regular alternation of pause and movement in the reading eye, to which attention has recently been called almost simultaneously on both sides of the Atlantic.² On the other hand, the experimental demands in the apparatus for the study of reading can only be satisfied when the eye reaction is understood and measured.

¹ Erdmann und Dodge, *Psychologische Untersuchungen über das Lesen*. Halle, Max Niemeyer, 1898. S. 68-76.

² Op. cit., Kapitel I. E. B. Huey, Preliminary Experiments in P. and P. of Reading, *Am. Jour. of Psy.*, July, 1898. P. 583.

The most favorable conditions for the exposure of letters, words, etc., will naturally approximate the conditions of the normal pauses of the eye in reading. Simplicity in the experimental conditions, however, demands that indiscriminate change in the point of regard should be eliminated.

In all previous experimental work where exclusion of the eye movements was essential, recourse was had to illumination of very short duration.

Helmholtz, Aubert and others used for illumination an electric spark, whose duration Helmholtz estimated at a fraction of a thousandth of a second. Under less exacting conditions it has been customary to use intervals varying from 1 to 10 thousandth of a second, assuming that the movement of the eye during such small intervals of time could be disregarded.

The fact above referred to, that the eye can perceive nothing in a complex field over which it sweeps during the movement itself, evidently prevents any compromising effects arising from a movement begun before or simultaneously with the exposure; and makes it possible to use an exposure whose duration is limited only by the time which would permit the eye to begin and carry out a new movement after the exposure had begun. Such a lengthening of the exposure as this would permit, not only reduces the mechanical difficulties of exposure apparatus, but has the more important advantage of adequate stimulation. Equally desirable in view of the interest that has suddenly sprung up in the psychology of reading is the adoption of a generally accepted interval of exposure, by whose use the results of different investigators may be made comparable.

It is in the interests of such a standard exposure that I have thought it best to present results of measurements in a short paper independent of their general theoretical bearing.

The strained conditions and consequent inevitable functional disturbances which all attachments to the eye must produce, render all results with such appliances open to serious criticism; while the general discomfort of such methods necessarily limits their applicability. These mechanical difficulties led to the discovery of a purely optical method which, in spite of the rather clumsy apparatus at our command in Halle, was

so satisfactory that I have used it, with some modifications of detail, in the following measurements.

In general the method is as follows: A stimulus f , capable of variation and accurate measurement in duration, is thrown on the blind spot of an eye at rest. Since any slight movement of the eyes will bring it into view, the natural movement, which follows some peripheral stimulation c , will bring it into view, provided its duration is sufficient. The necessary duration of the stimulus f , which will just permit the observer to see it after the cue for movement is given, is evidently the reaction time of the eye.

As the aim of the Halle measurements was solely a negative one, viz., to determine a maximum safe exposition time, we did not feel warranted at that time in constructing the special apparatus required for a more accurate measurement.

In designing a pendulum tachistoscope for some general work at the Wesleyan University Laboratory I incorporated the special features necessary for satisfactory measurements of the eye reaction. The essentials of the apparatus are as follows: A heavy second pendulum resting on broad knife edges and swinging through 90° , carries two large disks on its axis, one of which is temporarily fixed, while the other may be rotated and clamped at any point. The smaller disk has a radius of 12 inches; the larger, of 16.5 inches.

One inch from the periphery of the smaller circle is drawn a fine black arc, concentric with the disk, which, when viewed through a blackened tube and a horizontal slit in a black screen, placed immediately in front of the disks, appears as a short vertical line as long as the horizontal slit is wide. This serves as the primary point of regard, and would not change its appearance, even during the oscillations of the pendulum, if the arc were long enough. The arc is, however, so short that before the pendulum has completed $\frac{1}{6}$ of its excursion, after release, the primary point of regard disappears; and at the same moment there appears a similar short line, which serves as the peripheral stimulation, made by a concentric arc $\frac{1}{8}$ inch from the periphery of the smaller disk. The excursion of the eye as it looks from the disappearing primary point of regard to the

appearing peripheral stimulus, is a double sine of $\frac{7}{8}$ inch in length, corresponding to an arc of about 3° , when the axis of rotation of the eye is 16 inches distant from the disks. Four inches from the primary point of regard in the larger and movable disk is cut a circular slit, $\frac{1}{8}$ inch wide, concentric with the disk. Through this slit a strong light corresponding to f falls on the blind spot when the eye is at its primary position, and becomes visible only after the eye moves.

The reaction time of the eye is evidently measured by the necessary length of the arc corresponding to the stimulus f .

In the Wesleyan apparatus this is measured in .01" by direct reference to the vibrations of a tuning fork, registered on the periphery of the inner or fixed disk.

The whole apparatus has a delicate levelling adjustment, and the oscillations of the pendulum are consequently constant.

Since the release of the pendulum, although practically noiseless, is nevertheless usually perceptible as a slight jar, the result of the eye movement is not registered on the first oscillation of the pendulum, but always on the second. The observer only answers the question whether the bright stimulus was seen or not seen. The record is ignored in the calculation if the observer was conscious of false movements or imperfect fixation.

The results of the experiments are given in the following tables. Observer \mathcal{Q} is Mr. E. M. Quittmeyer, class of 1899, Wesleyan University, an honor student in philosophy.¹

Observer D is the writer. A long series of preliminary experiments gave for each experimenter the probable upper and lower limits of variation from the true reaction mean.

The succeeding experiments were made in blocks of ten, in which ' f ' was given an arbitrary duration. A sufficient number of such blocks of experiments was made to give D 100 experiments each, when ' f ' had the values 160, 170, 180 and 190 σ , after the cue for movement had been given. \mathcal{Q} made 50

¹ Mr. Quittmeyer's services in the experiments reported are more than the faithful work of a careful observer. Many of the details of illumination are due to his suggestion, and if a number of circumstances had not conspired to prevent it, it was intended that he should make the report.

experiments each when ' f ' had the values 150, 160, 170, 180 and 190 σ .

The lower limits were determined by a larger number of trials, as they were of peculiar importance. No attempt was made to determine accurately the upper limits beyond which no negative answers were given. As is general in reaction studies, the maximum records have very little meaning, owing to the complex conditions which determine them.

In a very large number of experiments \mathcal{Q} 's lower limit for ' f ' was 140 σ . D 's lower limit for ' f ' was 150 σ .

\mathcal{Q} .

$f =$	150	160	170	180	190
seen =	2	6	31	41	44
not seen =	48	44	19	9	6

The mean reaction time evidently cannot be reckoned as an arithmetical average of all the reactions, but must be given as that value which ' f ' must have in order that just as many reactions should lie above as below it. This will be the case when

$seen = \frac{n}{2}$. From the above data it is evident that the mean reaction of \mathcal{Q} lies between 160 and 170, and must have a value of 167.6 σ .

D .

$f =$	160	170	180	190
seen =	15	41	58	73
not seen =	85	59	42	27

The mean reaction time of D lies consequently between 170 and 180, and has a value of 175.8 σ .

It is evident that the time interval thus measured does not correspond exactly with the reaction time as ordinarily understood. In addition to the peripheral and central processes, which theoretically make up the true reaction time, the eye reaction includes two other processes: first, the slight movement necessary to bring the light on to a sensitive part of the retina; and secondly, the duration of that stimulation necessary to produce a sensation.

Of these the second is well known to be only a fraction of a thousandth of a second, and may be disregarded.

The first is apparently more important; but, according to the known rapidity of the movement of the eye, must be much smaller than the mean variation, since the eye moves through 5° in 10-15 σ ;¹ while the stimulus 'f' touches a sensitive part of the retina and appears as a bright band before the eye has moved 1° in 30'. Moreover, this small lost movement is scarcely to be obviated by any mechanical means, since it represents an excursion of a point on the cornea of about .011 inch, an excursion which even the most delicate mechanical attachment could scarcely reduce.

If we attempted any correction for these constant errors, it would reduce the mean reaction time about 6 σ .

Q to 162 σ .

D to 170 σ .

The minimal reactions, however, signify more for the determination of experimental conditions than the mean reaction time. In view of the foregoing measurements, I feel justified in making the general recommendation that whenever practicable the exposures in the psychology of reading, as well as elsewhere, where a maximum constant exposure is desired, which is still too short for a change in the primary point of regard, be given a uniform duration of .1".

Undoubtedly a slightly longer exposure might be used in most cases; but, in general, I believe it to be advisable to use a duration so small that it may remain constant, while the ease with which .1" can be measured and controlled is perhaps an added argument in its favor.

There is a difficulty in the above method that makes it useless for unpractised observers; this is the general inability to keep the eye fixed when expecting a peripheral stimulation. It, however, is the most accurate optical method when one has become master of the eye movement, since a very slight movement is enough to bring the bright light into view.

¹Lamanski, Bestimmung der Winkelgeschwindigkeit der Blickbewegung. *Pflüger's Archiv f. d. g. P.*, II., p. 418-422. Dodge, Anhang zu psychologische Untersuchungen über das Lesen.

A much simpler method is recommended when the aim is merely to control the time of exposure, or to demonstrate to a class that within the given exposure no movement of the eye takes place. Under these conditions it is only necessary to expose two letters for the interval in question, far enough apart, so that when either one is fixated the other is not recognizable. If one is exposed at the primary point of regard, only a movement can make the other visible; and unless it is possible, after repeated trials, to see both, the interval of exposure must be too short for the movement in question. If the attempt were made to determine the mean reaction time by this method, the corrections for the time of movement of the eye would assume considerable importance, and would demand special measurements.

A STUDY IN THE DYNAMICS OF PERSONAL RELIGION.

BY PROFESSOR GEORGE ALBERT COE.

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Up to 1891 the history of psychology contained no example of the systematic application of empirical methods of research to the religious phenomena in the midst of which we are living. Since that time, however, President Hall and several of his pupils, notably Professor Starbuck, have published significant contributions upon certain branches of this subject.¹ The chief result is the establishment of definite correlations between religious experience and adolescence. The conclusion most thoroughly worked out is that the period of greatest religious transformation for both males and females is, in general, the period of physical transformation from childhood to adult life. Another important generalization is that what is called conversion is only one of many forms in which a normal adolescent religious change clothes itself. From the case in which childhood religion grows mature without special agitation, to the cases in which conversion takes place amid volcanic outbursts of emotion, there is every grade and variety of disturbance, though with the same general outcome when adolescence is over.

These differences have never been satisfactorily accounted for, and indeed the question has hardly been raised except for the sake of hazarding a guess. "The explanation of sudden conversions," says Bain, "is no doubt to be sought in some overpowering impression upon the mind that supplies a new and energetic motive to the will, thereby initiating a new line of

¹G. Stanley Hall: *The Moral and Religious Training of Children*, *Ped. Sem.*, I., 196ff.; E. D. Starbuck: *A Study of Conversion*, *Am. J. Psy.*, VIII., 268ff., and *Some Aspects of Religious Growth*, *Am. J. Psy.*, IX., 70ff.; A. H. Daniels: *The New Life*, *Am. J. Psy.*, VI., 61ff.; J. H. Leuba: *A Study in the Psychology of Religious Phenomena*, *Am. J. Psy.*, VII., 309ff. See also Luther Gulick: *Age, Sex and Conversion*, *Association Outlook*, Dec., 1897.

conduct. * * * Such changes occasionally happen, but not without terrific struggles, which prove how hard it is to set up the volition of a day against the bent of years."¹ Here all sudden conversions are lumped together as though they were all of one type; all are declared to be accompanied by terrific struggles, and all are explained by a single circumstance.

Equally incomplete is the explanation of Nietzsche when he snarls at Christianity because, as he thinks, it is not in contact with reality. He declares that Christianity cultivates "an imaginary psychology (nothing but self-misunderstandings, interpretations of pleasant or unpleasant general feelings,—for example, the conditions of the *nervus sympathicus*,—with the help of the sign-language of religio-moral idiosyncrasy,—repentance, remorse of conscience, temptations by the devil, presence of God").² Doubtless this statement contains some truth; yet it is as inadequate to explain the broad variety of experiences occurring under Christian influences as it is to explain the whole sphere of perception, normal and abnormal together.

Here and there a more probable hint has appeared. Thus, Havelock Ellis makes the remark that a sudden explosion of suppressed hypnotic centers is 'the most important key to the psychology of conversion.'³ Leuba, speaking of the conversion of John Wesley, throws out this hint: "An interesting remark can be made here concerning the influence of suggestion: it is as the change that God works in the heart is being described that the very same transformation takes place in Wesley."⁴ The same writer also remarks that "the particular forms in which affective states dress themselves are functions of the intellectual atmosphere of the time."⁵ This is undoubtedly a hopeful clue; but when the same writer goes on to affirm that joy "is never altogether wanting, and is always violent during the first hours or days that follow,"⁶ he misses an essential fact. Starbuck was, I believe, the first writer to give adequate recognition, with

¹ *Emotions and Will*, 3d ed., N. Y., 1876, 453f.

² *Antichrist*, Works, N. Y., 1896, XI., 253.

³ *Man and Woman*, 2d. ed., Lond., 1898, 292.

⁴ *Psy. of Relig. Phenomena*, *Am. J. Psy.*, VII., 340.

⁵ *Id.*, 357.

⁶ *Id.*, 351.

empirical data, to the marvellous varieties that cluster about such terms as conversion. He advanced a step toward their explanation, also, when he showed that something more than a conscious exercise of either intellect or will was central in adolescent conversions.¹ He came still closer to the problem when he found imitation, example, etc., present as motives in 15 per cent. of his cases.² Nevertheless, a moment's reflection upon the capacity of the average person to tell the truth regarding his own motives will reveal some insecurity in these results and bring up the whole question of the best method of getting at the facts. Another clue emerged in Starbuck's admission that 'much depends upon temperament.'³ Yet this clue has never been followed up. In fact, this same writer, commenting on some of his cases, confesses that some religious experiences 'seem to come in the most unaccountable ways.'⁴ Now, I venture to believe that, if we could secure sufficiently full information as to the conditions, every one of these cases could be accounted for.

The present study, accordingly, is an attempt at a more complete analysis of individual cases than has heretofore been attempted. If we can lay bare the factors in a few cases that are fully accessible, the information thus acquired may afterward be of service in interpreting the broader differences of sects and religions. To forestall misunderstandings, it may be well to state at this point that the phrase 'the dynamics of personal religion' is not intended to convey, and cannot properly convey, any metaphysical meaning. The problem concerns the concomitance of certain groups of phenomena and nothing more. The question of divine influences in the mind of man and in history must stand in exactly the same position at the end of such a study as it does at the outset. Any one who prefers to do so is at liberty to interpret every result as a description of the mode of God's working in the world. Nothing in the study itself has any logical tendency to undermine this belief.

Our task consists in looking for coordinations between specific inner states and tendencies and specific external circum-

¹ *Am. J. Psy.*, VIII., 292.

² *Id.*, 281.

³ *Am. J. Psy.*, IX., 110.

⁴ *Id.*, 81.

stances. We are confronted at the outset with the problem of how to secure adequate data. In previous studies in the psychology of religion reliance has been placed upon the *questionnaire* method, which consists in securing from many persons written answers to printed questions regarding their experiences. This is doubtless a satisfactory method of securing certain facts; but our inquiry calls also for information which the writers of such papers ordinarily do not and cannot possess. Accordingly, my question list was so constructed and the answers so used as to make the latter not merely a record of certain facts, but also a reflection of the personality of the writer. These answers were also supplemented in various ways: First, personal interviews were had with a large proportion of the persons examined. The cross-questioning which these interviews made possible not only cleared up doubtful points in the papers, but also elicited many new and important facts. Second, a large proportion of the subjects were placed under careful scrutiny by myself and others, with a view to securing objective evidence as to temperament. These observations were guided by a carefully prepared scheme of temperamental manifestations. Third, interviews, based upon the same scheme, were had with friends and acquaintances of certain of the persons under examination. Finally, in order to get at the facts of suggestibility, hypnotic experiments were made upon all the important cases that were accessible. Fuller description of some of these methods of gathering data will appear later.

The number of persons examined was 74. Of these, 50 were males, and 24 females. Nearly all are college students who are healthy in both mind and body and have had the advantage of positive moral and religious training. Nearly all are just past, or are just passing out of, the adolescent period. The average age of the men was 24.7, and of the women (one case, 65 years of age being excluded), 22. Though this narrows the range of observation of temperament chiefly to the formative years, it brings these compensating advantages: the nearness of the chief religious experiences, the habit of introspective analysis specially characteristic of adolescence, and the naïve and spontaneous expression of personal facts. Again, a

large majority of the subjects were brought up under the influence of the Methodist Church, which lays great stress upon personal religious experiences. The opportunity to study the effects of suggestion was therefore excellent. In general, in spite of some limitations of the field of observation, the differences in both type of religious experience and type of mental organization were many and great. The accessibility of the material, moreover, and the opportunity to observe, ask questions and experiment repeatedly—these easily outweigh all the limitations. It is, indeed, not easy to see how a more satisfactory set of cases could be secured.

Let us now turn to the variations in religious experience from individual to individual. The chief one, and the one with which this study is occupied, is in the degree of abruptness of religious changes. One person reaches a higher plane of the religious life by a process of development scarcely ruffled by excitement; another attains the same state by passing through a mental cataclysm. Some elements of the explanation lie on the surface. For instance, the striking changes occur chiefly among denominations that definitely aim to secure them. Furthermore, these denominations have discovered many of the conditions favorable for producing such changes, such as a particular type or particular types of preaching and appeal; the use of music, particularly of certain kinds; intense social feeling fostered by meetings; the provision of external acts, signs or instruments—such as rising for prayers or to indicate decision, going forward, the altar, the mourners' bench—all of which evoke expression of the inner state and thereby intensify it; and, finally, the fitting of all the conditions together so as to produce a climax or a series of climaxes. What we need to determine next is the mental mechanism to which all this appeals, and also the reason why it fails of its result in many cases in which the conditions give hope of success. For it is a matter of everyday knowledge in revival churches that of two persons brought up in the same manner, and apparently meeting the same conditions, one may experience a brilliant conversion, while the other may experience no such states at all.

In order to secure definite ground for an hypothesis on this

point, the persons under examination were divided into two groups: those who had experienced a marked transformation, and those who had not. The fact that religious changes show all degrees of rapidity and of emotional intensity made it necessary to draw this line with great care. In every case, therefore, which the papers left in doubt, a personal interview was had. Striking transformation was defined to the subject as a profound change, which, though not necessarily instantaneous, seems to the subject of it to be distinctly different from a process of growth, however rapid. As soon as the subject grasped this definition, he was requested to classify himself, and his decision was accepted as final.

In the second place, a cross division was made on the basis of predisposition of the mind toward such experiences. Let us call this basis 'expectation of transformation.' A careful study was made of the home influences, the general church environment and the specific circumstances surrounding the religious awakening. Here, again, much had to be drawn out by personal interviews. A considerable number of the subjects had been taught that one who has been religious from childhood does not need a marked conversion. Others indicated that their thoughts were never turned strongly in the direction of conversion. All such were classed as not expecting a transformation.

Combining these two modes of division we secure two positive classes for minute study—those who expected a transformation and experienced one, and those who expected, but failed to experience. In the working out of this scheme a third division was found necessary in order to tabulate cases in which these two classes overlap; for a number of persons who experienced a marked transformation were unsatisfied and sought for something more without securing it, while others were satisfied, but sought for a still higher experience in vain.

To do justice to the case, it is necessary to note the caution that was exercised in making the classes. For example, in the class of those who expected but failed to experience there are included none who did not distinctly declare that they sought an experience without finding. Most, if not all, of them had subsequently learned how to be religious in spite of this disap-

pointment, yet the struggle in a large proportion of the cases had been acute.

From theology the suggestion may come that possibly these persons did not really surrender themselves to God. But an *a priori* assertion, or rather guess, like this ought to have little weight as against the following: All the evidence of the facts goes to show that those who were disappointed had put themselves in the same attitude of will as the others: furthermore, a large majority of the disappointed ones are now living positively religious lives in the evangelical sense of religious.

These two classes were next examined with respect to temperament. This was a laborious and perplexing undertaking, both on account of the unsatisfactory treatment of temperament by writers on psychology, and because of the complexity of the facts to be observed. It is easy for any psychologist to give a classification of temperaments that can be brilliantly illustrated from history, but it is quite another thing to devise a method for grouping the persons one comes in contact with. At the present day two classifications are employed. The first, represented by Wundt¹ and many followers, is based upon the fact that one's mental processes may vary in both rapidity and strength. This basis yields four temperaments which correspond fairly well with the traditional fourfold division. The rapid-strong temperament corresponds to the choleric, the rapid-weak to the sanguine, the slow-strong to the melancholic, and the slow-weak to the phlegmatic. On the other hand, French writers for the most part adopt a qualitative basis—that is, classify according to the faculty or function that predominates. This is true of Ribot,² Queyrat,³ Levy⁴ and Fouillée.⁵ Perez, however, retains liveliness and intensity as the basis.⁶ This is not the place to discuss the general topic of temperament, nor to go into the merits and defects of these two plans of classifica-

¹ *Grundzüge der Phys. Psy.*, Leipzig, 1893, II., 519ff. See also Lotze: *Microcosmus*, Vol. II., Bk VI., Ch. II.; and Ladd: *Elts. Phys. Psy.*, N. Y., 1897, 572ff.

² *Psy. of the Emotions*, London, 1897, 388ff.

³ *Les Caractères*, Paris, 1896, 36ff.

⁴ *Psy. du Caractère*, Paris, 1896, 182ff.

⁵ *Tempérament et Caractère*, Paris, 1895, 20ff.

⁶ *Le Caractère*, Paris, 1892.

tion. It is sufficient to remark that a practical scheme must provide at least a fairly definite mode of describing any and every person whose individuality is sufficiently marked to be noticeable at all.

Wundt's scheme was first employed, but it quickly proved itself inadequate to give a genuine characterization of many distinctly marked individualities. This was especially true when Wundt's classes were interpreted as if they were identical with the traditional four temperaments. The qualitative plan was next tried; but, while it supplemented the other, it proved inadequate taken by itself. In the interest of a workable scheme, therefore, it was found necessary to combine the two modes of division. The result was not a new classification of temperaments, but what we may call a scheme of the constituents of temperament. The mode of procedure now consisted, first, of judging whether sensibility, intellect or will was the most prominent faculty; next, of finding the second in prominence; then of estimating the place of each of the three faculties in respect to promptness and intensity. For each subject, in the end, there were three descriptive designations, as, for example, prompt-intense intellect, prompt-weak sensibility, prompt-weak will; and these three were arranged in the order of prominence.

The sources of evidence for temperament were the same as those employed by the writers just named, namely, permanent modes of action, of speech and of point of view; permanent interests; likes and dislikes; habitual social interactions, etc., whether observed and recorded by the subject himself or by other persons. The data were secured by the following methods: First, by inserting in the question list a number of questions concerning likes and dislikes, laughter and weeping, anger and its effects, habits of introspection, moods, promptness or its opposite in decisions, ideals, the effects of excitement, habits with respect to physical activity, etc. A particularly fruitful interrogation was the following: "If you were obliged to spend a whole day alone, felt at perfect liberty to follow your inclinations and had the means to do so, what would you do?" At no point in the questions was temperament or disposition mentioned.

The second method was by observation of the general tone of the papers. The question list, it may be remarked, was very lengthy. It included approximately 200 specifications, all planned with reference to the evoking of memories rather than the securing of categorical replies. Its length precludes its presentation here. The responses were correspondingly extended, and not the least remarkable thing about them was the amount of information they imparted between the lines. It was obvious that they were not merely a record of phenomena, but also a body of original phenomena. Sometimes what they purported to be as a record had to be offset by what they were as new facts. Thus, in response to the question, 'Do your friendships last?' nearly every writer gave an affirmative answer. Here it is probable that the ideal of the writers rather than their actual experience comes to expression. These answers have value, therefore, as evidence of the nature of the social instinct, but hardly as evidence of actually existing social relations. Occasionally the manner of responding to a question revealed more than did the content of the response. Intellectual interest stood out in one, strenuous seriousness or passionate earnestness in another, while the chattiness of a third revealed a type of impressionability strongly contrasted with both.

A third method was by objective observation and interviews, as already described. The scheme of questions underlying this part of the investigation was also extended. It included, among other topics, the following: The habitual state of the muscles, particularly the face, whether tense or relaxed; one's carriage and motions, whether quick, jerky, irregular, or more slow, free and pendulum-like; one's mode of speech and the quality of the voice; the expression of the eyes, and any other signs that show whether the subject is wide-awake to his surroundings; whether one is more given to the reception of impressions or to active effort to control surroundings; readiness to laugh and cry; specific manifestations of anger; characteristic moods; persistency; social self-assertiveness of various types; intellectual habits; religious habits.

The data obtained by all these methods were compared, and

thus the final judgment was based upon a really wide range of facts. Furthermore, in most cases, independent judgments were formed by different observers, and these judgments were finally checked off against one another. As soon as a definite and comprehensive mode of procedure was discovered, the facts began to fall into place with the sort of inevitableness that inspires confidence in one's method. The amount of agreement reached by observers independently of one another was another evidence of the trustworthiness of the method. If the lack of precision and of quantitative determinations should seem to impair the value of the results, two considerations might be offered in defence. The first, is that all the knowledge of temperament possessed by biographers and historians and by literary workers, and nearly all that possessed by psychologists themselves, has been gathered by methods analogous to this, though rarely, if ever, by methods so systematic and comprehensive. The other consideration is that this manner of learning men is one of the bases of the world's successful business. Indeed, a large part of the practical interests of life hang upon our ability so to observe temperamental manifestations as to be able to predict the general quality of one's reactions in different sets of circumstances. Of course, this is not a sphere in which claims to scientific infallibility become even plausible; nevertheless, the thorough and systematic analysis employed may fairly entitle the results to some degree of confidence.

The temperamental classification of the members of the three groups concerning whom adequate information was obtainable yields the results shown in the table on the next page.

The most marked contrast in this table concerns the relation of the two main groups to intellect and sensibility. Where expectation is satisfied, there sensibility is distinctly predominant; but where expectation is disappointed, there intellect is just as distinctly predominant. To appreciate the strength of this conclusion, it will be well to remind ourselves once more of the range of facts upon which it is based. In only three cases in Group I. and one case in Group II. was it necessary to rely solely upon the subject's paper. A second interesting result is that those whose expectation is satisfied belong almost exclusively

to the slow-intense and prompt-weak varieties, the temperaments approaching most nearly those traditionally known as the melancholic and the sanguine. On the other hand, those whose expectation is disappointed belong more largely to the prompt-intense variety, or the choleric temperament; though the distribution between the choleric, melancholic and sanguine is not

RELATION OF STRIKING TRANSFORMATION TO TEMPERAMENT.

	Sensibility Predom- inant.	Intellect Predom- inant.	Will Predom- inant.	Prompt- Intense.	Slow- Intense.	Prompt- Weak.	Slow- Weak.
GROUP I.—17 persons who expected a transformation and experienced it...	12	2	3	1	6	8	2
GROUP II.—12 who expected but did not experience...	2	9	1	7	3	2	
GROUP III.—5 others who belong to both the above classes.....	2	2	1				

markedly uneven. Again, comparing the two main groups with respect to promptness and intensity, each by itself, we find that, on the whole, Group II. exceeds Group I. in both promptness and intensity. Finally, some slight confirmation of the representative character of these results is found in the heterogeneity of the cases in Group III. The full significance of these results concerning temperament, however, will not appear until we have examined the same subjects with respect to automatisms and suggestibility.

Careful inquiry was made, both in the question list and by personal cross-questioning, for evidence of mental and motor automatisms. The inquiry divided itself into these heads: striking dreams in connection with religious awakenings; hallucinations in connection with religious transformations; hallucinations occurring at other times; motor automatisms occurring at the time of religious transformation, and similar automatisms occurring at other times. The purpose of the inquiry did not make it necessary to render these various classes

rigorously precise. Accordingly, when it was difficult to decide whether a given phenomenon was to be classed as a dream or as a hallucination, I followed the impression of the subject. If he insisted that he was awake at the time, the experience was classed as a hallucination. Similarly, the group of motor automatisms contains some cases that fall near the boundary line. But, in general, it is believed that the list which follows is a full and substantially accurate census. It contains all the facts of these classes discovered in the entire investigation.

Striking dreams in connection with religious awakening:

Dreamed of being cast into hell. Suffered all the torments of the damned that he had ever heard about.

Dreamed of being cast out of heaven.

Dreamed of a heavenly procession which he could not join.

Dreamed of taking an examination of fitness to go to heaven.

Hallucinations in connection with religious transformation:

Streaks of light shone down.

A somewhat bright, diffused light just above the eyes; occurred twice.

Seemed to observe the joy in heaven.

Saw a vision of the broad way and of the narrow way, with many persons in the former and few in the latter.

Motor automatisms at time of religious transformation:

Uncontrollable laughter for fully five minutes.

A powerful thrill through the whole body.

Sudden clapping of hands before any change of feeling came.

Tobacco habit broken without effort or even seeking.

Other hallucinations:

Saw a light spring up from a tomb in a cemetery.

Used to hear his name spoken when he was about to commit some sin.

Had just retired after private devotion. Saw a dim, diffused light above the eyes.

Was touched by an absent friend.

Saw a dog that was not there.

Heard deceased grandfather's voice.

Heard mother's voice when she was far away.

Heard the voice of a friend.

Felt the presence of an absent friend. It seemed to be an objective fact and not a mere impression.

Heard music different from any he had ever listened to.

Heard angels sing.

In the midst of a public speech twice saw a scene he was describing.

Childhood fear of the dark has persisted. The feeling that a fiend is just behind and ready to spring upon him sometimes becomes so intense that self-control becomes impossible.

An inner voice which expresses approval at times of perplexity by saying, "Fear not, I am with you."

God tells her where things are that she is looking for. Also tells her things before they come to pass.

Voices and visions just before sleeping at night. Has often gone to the window or out of doors to see where the music came from.

Up to age of thirteen used every night to see figures in the room.

When praying had a vision of an absent friend who gave just the information that was desired.

Waked one night and saw a great luminous eye in the ceiling : thought it was God's eye.

Other motor automatisms :

Automatic laughter.

At times something very holy seems to be dictating his thoughts.

Has always felt himself under two influences : one good and one bad, and neither of them any part of himself.

Surprising and incomprehensible outburst of defiance to God at age of about ten or twelve years ; shook fist at the sky and told God he hated him.

"The Holy Spirit often fills me so that I feel light, and it's no trouble to walk and not feel tired." (A lady well advanced in years.)

Talking, singing, whistling to one's self. This seems, at times, to become an automatic, sub-conscious performance. A parent affected in the same way sometimes lets out secrets by this means.

Let us now ask how these phenomena, exclusive of the dreams, are distributed among the different sets of cases. Of eighteen persons in Group I., eight have had either hallucinations or motor automatisms; of the five persons in Group III., four have had similar experiences. Hence of twenty-three persons who have had a striking religious transformation, twelve have also exhibited these automatic phenomena. But of the twelve persons in Group II., who sought a striking religious transformation in vain, only one has had either a hallucination or a motor automatism.

The total number of persons examined with respect to automatisms was seventy-four. Of these, nineteen had exhibited such phenomena; but twelve of these nineteen persons are found in Groups I. and III.—that is, one-sixth of the entire number of persons examined embrace two-thirds of the cases of automatisms. Putting these results in the form of percentages, we get the following:

General average of automatisms for 74 persons, $25\frac{2}{3}$ per cent.

Average for those who have experienced a striking religious transformation, . . . 52 “

Average for those who sought such a transformation in vain, . . . $8\frac{1}{3}$ “

In other words, the average for those who had a striking religious transformation is twice as high as the general average, and six times as high as the average for those who sought such a transformation in vain.

If the general average of automatisms seems rather excessive, the following explanatory circumstances should be borne in mind: First, motor automatisms are included along with hallucinations. Secondly, nearly all the persons examined were too young to have forgotten such experiences. Thirdly, the cross-questioning already described brought out a number of facts not elicited by the *questionnaire*, and not likely to be elicited by a census of hallucinations conducted by correspondence alone. Finally, it now becomes obvious that the high general average depends upon the *presence* of a relatively large number of persons who have experienced striking religious transformations.

The results are so unequivocal that interpretation is unnec-

essary. It may be worth while to add, however, that in two cases of motor automatism occurring at the time of religious transformation there was clear evidence of a congenital tendency to such performances. In both cases a parent had exhibited a similar automatism under similar religious conditions. In a third case it was possible to identify a phenomenon as probably automatic through a similar but more pronounced phenomenon in a parent. One case of hallucination was likewise clearly referable to congenital tendencies. Three of these four cases of congenital proclivity belong in Group I. Furthermore, to Groups I. and III. belong nearly, if not quite, all the persons who have experienced the healing of disease by faith, those who have received remarkable assurance of answered prayer in advance of the event, and those who reported other veridical premonitions. The conclusion is that the mechanism of striking religious transformations is the same as the mechanism of our automatic mental processes.

There remains for study the relative suggestibility of the three groups. At first thought, this seems to be a simple problem of more and less. But it is neither simple nor merely quantitative. Indeed, the qualitative varieties of suggestibility are quite as marked and quite as important as the 'suggestibility and non-suggestibility' which chiefly figure in the literature of suggestion. It must have struck many experimenters as a strange incident that, whereas persons of sound body and trained mind make excellent subjects, most of the literature represents suggestibility as identical with relative prominence of the lower centers. The fact seems to be that some persons are easily hypnotized, not because the higher rational centers are undeveloped, but precisely because the high development of these centers,—the habit of prompt concentration of voluntary attention,—makes it possible to follow the suggestions of the operator with precision. Moll remarks that the ability to direct one's thoughts in any particular direction is favorable to hypnosis, but that this ability is usually considered to be a sign of strength of will.¹ As the persons under examination in the present part of our study are, perhaps without exception, healthy, and as all have had con-

¹ Hypnotism, London, 1895, 40.

siderable mental training, it will be seen that ready response to suggestion cannot be regarded as an unambiguous sign. The experimentation was begun under the tentative hypothesis that auto-suggestion might possibly account in part for the failure of persons in Group II. to secure the desired experiences. The problem then became whether external suggestion was more prominent in Group I. and auto-suggestion in Group II.

The problem may be more precisely put by distinguishing between passive suggestibility and spontaneous auto-suggestion. The necessity of thus stating the distinction grows out of the ease of misunderstanding certain phenomena, particularly those commonly described as 'resisting the operator's suggestion.' Thus, if a subject struggles to open his eyes when I tell him that he cannot do so, this is no evidence of spontaneity. For the very assertion, in the early stages of hypnosis, that the eyes cannot open is a challenge to try; it is a double suggestion. This was exquisitely demonstrated upon one of my subjects. For some time I had tried in vain to close the eyes by making the usual passes and giving the usual suggestions of drowsiness, etc. At last the subject, who was apparently wide awake, declared that she could not close them and keep them closed. Catching at this hint, I suddenly remarked, "You cannot close them!" They immediately clapped shut with every appearance of doing it automatically. In another case in which the usual suggestions seemed to have little or no effect, the subject was instructed to keep his eyes closed voluntarily for a while; but his eyes opened very soon, and did so repeatedly. He finally declared that it seemed as if he *could not* keep them closed. In two other cases it was found that a previously formed conviction on the part of the subjects that they were suggestible had tended to make them appear more passive than they really were.

What was looked for, then, was evidence of spontaneity or originality, rather than mere readiness of response or its opposite. An illustration or two will make this clear. To one subject I declared that his outstretched arm was rigid and could not move. The arm immediately stiffened out, but began a series of incipient up-and-down motions. This was clearly a product of my own suggestion, as were also, perhaps, the sympathetic writh-

ings of the body and contortions of the face. The cataleptic arm was the right one. Presently the left arm was raised and began to push down on the right one, evidently in an effort to lower it. Failing in the effort, the left arm itself now became cataleptic, and could not lower itself. Here the evidence of spontaneous auto-suggestion is unmistakable. Contrast this, now, with another case in which a suggestion was given that an arm was cataleptic. Certain incipient responses to the challenge were made as before; but they ceased in a few seconds, while the face and the rest of the body expressed little or no interest in what was going on.

Let us compare two other cases that are less striking, and yet unambiguous. In both, passes in front of the eyes and suggestions of heavy eyelids, etc., meet with very slow response, so slow that I finally close the lids with my fingers. If, now, I say "Your eyes are closed tight; you cannot open them," both subjects open their eyes. Similarly, they can unclasp their hands, and the like, whenever they are challenged to try. Thus far the two cases correspond point for point. But if, after closing the eyes, I leave the subjects alone, avoiding, as far as possible, the giving of further suggestions, a decided difference presently appears. One of the subjects sits with closed eyes for an indefinite length of time—that is, shows no initiative; but the other, as often as the experiment is repeated, spontaneously opens his eyes after a short interval.

Such experimentation resulted in separating the cases according to two fairly well-marked types. In respect to readiness of response to hypnotic suggestion the two types do not seriously differ. Under both types fall cases in which the response was almost immediate, and also cases in which it was very slow. But the behavior under suggestion was decidedly different. Let us call the two types the passive and the spontaneous. Under the former belong those who take no decided or original part in the experiment. Their response to external suggestion may not be very pronounced, but they initiate nothing after once they have begun to yield. Under the spontaneous type belong, on the other hand, the few who appear to be non-suggestible and those who, while responding to suggestion,

take a more or less original part by adding to the experiment or by waking themselves up.

Comparing Groups I., II. and III. with respect to this point, we find certain plain differentiations. To begin with, as might be expected, nearly all the persons who have experienced any of the mental or motor automatisms already described are 'passives.' Thirteen such persons were experimented upon, and, of these, ten clearly belonged to the passive type. This fact makes it appear that the two types here described are substantially parallel with those sifted out by certain experiments at Harvard University.¹

A few cases were not accessible for purposes of experiment. The numbers experimented upon in the two groups were respectively 14 and 12. All the persons in Group III. were experimented upon. The results are as follows: In general, the line between Groups I. and II. coincides with that between the passive and the spontaneous types, though apparent exceptions exist, and though the interpretation of the facts is not equally clear in all cases. Of the 14 cases in Group I. (persons who expected a striking transformation and experienced it), 13 are of the passive type. Of the 12 persons in Group II. (expectation disappointed) 9 clearly belong to the spontaneous type, 1 is entirely passive and 2 are open to some doubt. Of the 5 persons in Group III. (striking experience, yet disappointed), 2 are passive and 3 spontaneous.

The nature of the evidence may be further illustrated and the conclusion still further strengthened by reference to the negative and doubtful cases. The one case in Group I. that is not clearly passive is the one first mentioned on a preceding page in illustration of the double character of many verbal suggestions. This case is probably a passive one, therefore; though not so counted in the above figures. Another member of this group seemed for some time to be an exception to the general rule. She had had three striking experiences, and yet was apparently not suggestible. One day, however, mention having been made in the class in psychology of pain induced in a tooth by imagining a dental operation, she soon felt a tooth-

¹ Cultivated Motor Automatism, by Gertrude Stein, *PSY. REV.*, V., 295ff.

ache. It became intense and lasted for three or four hours, the face meantime becoming sore and apparently swollen. This settled the question of passive suggestibility. Turning, now, to the negative and doubtful cases in Group II., we find that the one clearly negative case is one that stands on the border between Groups I. and II. This subject had more difficulty in classifying himself than any other one in either group. Again, of the two cases scheduled as doubtful, one is the only case in this entire group in which any form of mental or motor automatism was discovered. Nevertheless, the case remains ambiguous; for, though external suggestions are accepted with every sign of passivity, the subject has heretofore practised auto-suggestion, even to the extent of curing toothache and other minor pains thereby. His present passivity, therefore, may be partly or wholly due to training. By way of parenthesis it may be remarked that each subject was questioned as to whether he had ever been hypnotized or had ever witnessed hypnotic experiments, and his reactions were judged according to his replies.

The correlation between one's religious experience and one's type of suggestibility was sometimes found to be curiously complete. Here, for example, is a subject whose response to passes and suggestions of drowsiness is not prompt; yet when the response comes it simply plumps itself. The subject is now very passive. In response to a suggestion, an arm quickly becomes cataleptic; but, in the midst of the experiment, something having incidentally appealed to the subject's interest, he spontaneously opens his eyes and appears to be completely out of the hypnosis. This man was converted at the age of sixteen, with marked manifestations. His whole being was thrilled with joy, and he had what he regarded as the witness of the Spirit. But from seventeen to nineteen he endured terrible storm and stress, in which he sought in vain to recover his original status. He finally settled down to the conviction that we are children of God in our deeds and thoughts rather than in our particular moods and feelings.

A still more remarkable parallel is as follows: Response very prompt; lids clapped shut and trembled. At the suggestion that they could not open, they quickly opened. The re-

mark was then made that perhaps the lids would not close so promptly next time. The suggestion worked, for now it required many passes to shut the eyes. The arm refused to become cataleptic; but when I began to breathe deeply and slowly, as if asleep, the subject's head promptly began to fall forward; and it continued downward until it rested on the breast. The subject was now apparently in a deep sleep; but after awhile a spontaneous awakening occurred. He was re-hypnotized and told that he could not pronounce his name; a gentle struggle ensued and lasted for a considerable time, but the effort was not given up until the name was successfully pronounced. The characteristics here are initial passivity followed after a while by decided spontaneity. This exactly describes the subject's religious experiences also. On two different occasions, after earnestly seeking for a marked experience, he happened to notice some incidental thing in his environment that he took to be a divine token. Immediately he experienced great exaltation; his heart's desire seemed to be realized; but after a few days the emotion waned, and reaction setting in pronounced a severe verdict upon the whole performance.

In order to appreciate the weight of these results concerning the relation of suggestibility to religious transformations, it will be necessary to notice once more the principle upon which cases were classed in Group II. This group contains no case in which there was not a distinct effort to obtain an experience that never came. Now, of the 74 persons examined, there are many whose training and environment were equally adapted to induce expectation and seeking, but did not do so. It is therefore probable that spontaneous auto-suggestion prevented expectation in some as it prevented the fulfillment of expectation in others. Hence, the sphere in which it plays a decisive rôle is undoubtedly much larger than the numerical proportions seem to indicate.

Moreover, no statistical display can do justice to facts of this sort. For not only must the numbers express in some degree one's interpretation of facts, and not merely the bare facts themselves, but the qualities with which we are dealing are too profound and pervasive to be expressed in any simple formula.

The whole style of one's mental organization is involved. It is safe to say that any observer of human nature would perceive the propriety of setting off Groups I. and II. from each other. The personalities in each group taken by itself are relatively alike, while the two groups are clearly different from each other. Psychology merely renders this obvious difference more precise by saying that the difference is one of temperament and of a more or less spontaneous attitude toward environment.

It has been shown that three sets of factors favor the attainment of a striking religious transformation—the temperament factor, the factor of expectation, and the tendency to automatisms and passive suggestibility. Let us, in conclusion, note the effect of combining these three factors. Of 10 cases in which there is expectation of a marked transformation, together with predominance of sensibility and passive suggestibility, the number whose expectation was satisfied was 9; but of 11 cases of such expectation, together with predominance of intellect or of will, and with spontaneous auto-suggestion, not one was satisfied. These numbers include cases from Group III. as well as from Groups I. and II.

If our groups seem to contain rather few cases, it should be remembered that a problem of this kind requires relatively complete knowledge of a few cases rather than an item or two of knowledge regarding many cases. Our procedure must necessarily consist in a gradual narrowing down of the range of cases, together with increasing minuteness of scrutiny in each case. As a matter of fact, we have approached about as closely to the strict method of experiment as the subject permits. The factors are so definitely identified that prediction becomes safe wherever either of the two combinations just mentioned is found present. Given three factors, the fourth—the general character of one's religious experiences—can be predicted with a high degree of probability.

It is supposed by many that striking transformations in the affective life are reserved for those who have been great sinners. The idea seems to be that an abrupt transition from moral badness to moral goodness naturally carries great emotional disturbances with it. And doubtless such circumstances do tend

to intensify whatever happens. But it does not at all appear that these circumstances are the chief factors that determine the degree of affective transformation at conversion; for among the cases belonging to Groups I. and III. there is only a meagre sprinkling of persons who had ever been bad in any very positive sense. In fact, of the entire 23 persons, only 5 report having experienced any sorrow for specific sins, and even then the sin repented of was generally a bad temper or some similar infirmity. On the other hand, of 13 persons in Group II., all of whom sought a striking transformation in vain, 3 also report sorrow for specific sins.

In short, everything goes to show that the chief circumstances favorable to these striking experiences are expectation, abundance of feeling and passive suggestibility with its tendency to automatisms. Shall we therefore conclude that conversion is practically an automatic performance? By no means. What has been proved is simply that when conversion or an equivalent change takes place in one's moral attitude toward life and destiny and God, it may clothe itself in certain emotional habiliments provided certain factors are present, but otherwise not.

"Would you cast the horoscope of a human life?" says Fouillée. "It is not to be read in the constellations of the sky, but in the actions and reactions of the interior astronomical system—do not study the conjunction of the stars, but those of the organs."¹ Similarly, we may now add: Would you understand the emotional aspects of religious experiences? Do not ascribe them to the inscrutable ways of God, but to ascertainable differences in men's mental constitutions; do not theorize about divine grace, but study the hidden workings of the human mind!

¹ *Tempérament et Caractère*, Paris, 1895, 88.

SHORTER CONTRIBUTIONS AND DISCUSSIONS.

ATTRIBUTES OF SENSATION.¹

I have the temerity to propose an attack upon the anomalous and, as I think, indefensible position of the so-called attributes of sensation: quality, intensity, extent and duration. Entrenched as it is behind traditional opinion, I hold that the entire conception of attributes of sensation is untenable, and this for two main reasons: first, because sensation is an elemental fact of consciousness and as such, by definition, irreducible: second, because each so-called attribute may be shown to be either itself an element of consciousness or a complex of such elements.

I.

Of these two, the more general argument should first be considered. By common consent of the psychologists who treat of consciousness from the analytic standpoint, sensations are unanalyzable elements. Thus Wundt² defines *Empfindungen* as "Zustände unseres Bewusstseins welche sich nicht in einfachere Bestandtheile zerlegen lassen"; Ladd³ says definitely that 'simple sensations' are "processes of our sense-experience which we are unable in any way to regard as composite or as analyzable into still more nearly ultimate factors"; Külpe⁴ coördinates sensations with affections as "letzten Elemente * * einer genauen Analyse"; James⁵ observes that "sensation, so long as we take the analytic point of view, differs from perception only in the extreme simplicity of its object or content," and Titchener calls sensations 'elemental conscious processes'⁶ and defines conscious elements as "mental processes which cannot be further analyzed, which are absolutely simple in nature and which consequently cannot be reduced even in part to other processes."⁷

¹ Read at the New York meeting of the American Psychological Association, December, 1898.

² *Physiologische Psychologie*, 4te Aufl., I., 281.

³ *Psychology Descriptive and Explanatory*, p. 92.

⁴ *Grundriss der Psychologie*, §3, ¶1.

⁵ *Principles of Psychology*, V. II., p. 1.

⁶ *Outline of Psychology*, §7.

⁷ *Op. cit.*, §4, p. 13.

Our next question concerns the nature of this analysis and its results. 'Element of consciousness' may mean the simplest concrete experience, the least complex content of actual consciousness; or it may mean the simplest distinguishable, though inseparable, ingredient of a given experience—a result of abstraction, an unanalyzable datum of consciousness. It can be shown that this second more rigid sense is that in which the word is used by those who treat psychology analytically. Thus Ladd is at pains to say that a "simple sensation is a convenient abstraction of psychological science¹ and definitely states that "such elements are never to be regarded as actually separable by analysis either from each other or from the state in which they are² said to exist. * * * No psychologist * * * thinks of maintaining the separate reality of the factors of mental life." Wundt's assertion is as unequivocal:³ "Isolirt ist uns die einfache Empfindung niemals gegeben, sondern sie ist die Resultat einer Abstraction." Similarly, Külpe says distinctly:⁴ "Die seelischen Elementarphänomene [sind] stets in irgend welcher Verschmelzung oder Verknüpfung mit anderen wahrnehmbar. * * * Ein wirkliches Erleben nur einer einzigen Empfindung kommt nicht vor." And with equal decision, Titchener⁵ asserts that "the particular sensation, regarded apart from other sensations is the product of scientific analysis, an abstraction of actual mental experience."

By common admission, therefore, the sensation, so far as it is analytically treated as an element of consciousness, is not a concrete experience at all, but a result of abstraction, useful for purposes of close observation and of scientific classification. It is certainly, then, an apparent contradiction to speak of the element as having attributes, in the ordinary meaning of attribute, which is just 'quality' or 'characteristic.' The element is precisely that which cannot be further reduced, characterized or qualified. Therefore, only the complex phenomenon has attributes, and these turn out to be precisely the elements of which it is composed.

This objection to the ordinary doctrine of attributes has been generally overlooked. Külpe, to be sure, says briefly:⁶ "Spite of the qualitative simplicity of the sensation, different attributes disclose themselves," and Schumann⁷ in a recent contribution, 'Zur Psychologie der Zeitanschauung,' observes that it is not securely set-

¹ *Op. cit.*, p. 92.

² *Ib.*, p. 89.

³ *Op. cit.*, I., 281.

⁷ *Zeitsch. f. Phys. und Psychol. der Sinnesorgane*, XVII., 1, p. 112.

⁴ *Op. cit.*, §3, ¶5.

⁵ *Op. cit.*, §43.

⁶ *Op. cit.*, §4, ¶1.

tled (*sicher festgestellt*) "how we come to distinguish the attributes of intensity, quality and temporal duration in the inseparable unity (*untrennbarer Einheit*) of an auditory sensation;" but these are cases in which the contradiction is calmly faced and accepted. Titchener proposes the following solution of the problem: "Although the sensation," he says,¹ "is an element of mind—*i. e.*, a process which cannot be split up into simpler processes—yet it has various aspects or attributes—presents different sides, so to speak—each of which may be separately examined by the psychologist." But the attribute, thus defined, cannot be distinguished from the element by the fact that it is presented to a psychologist and examined by him, for the same holds as true of the sensation itself as of any attribute. And the question at issue is precisely this: If the process really cannot be split up into simpler processes, how does it happen to have more than one 'side' or 'aspect'?

In the essay from whose earlier pages we have already quoted, Schumann seems to suggest² another explanation of the difficulty. He observes that the sensation, spite of its oneness (*trotz ihrer durchaus einheitlichen Natur*), can call up distinct judgments of intensity, quality, extent and duration. But in insisting upon the irreducibility of the sensation and in finding the diversity of the attributes in the judgments about sensation, he is as untrue to introspection as to traditional theory, for a sensation deprived of all its attributes will itself vanish. As Külpe has it, "Die Empfindung ist nichts ausser ihren Eigenschaften. Es bleibt kein Rest * * *." One may, of course, make judgments about quality, intensity and extent; but all judgments are based, in their last analysis, on immediate consciousness, and the attributes, in order to be judged about at all, must first be immediately experienced.³

The only detailed justification, which I know, of the theory of attributes, is contained in a discriminating paper, from which I quote at length, by Dr. Ellen Talbot, on 'The Doctrine of Conscious Elements.' "We have said," Miss Talbot remarks, "that when we have resolved our mental facts into facts which are themselves irresolvable, our process of analysis is finished. This is true; yet it would not be correct to say that there is no further occasion for analysis. There is need of a second process for the purpose of determining the

¹ *Op. cit.*, §8, p. 29.

² *Op. cit.*, p. 131.

³ *Op. cit.*, §4, ¶1.

⁴ *Philosophical Review*, IV., p. 162.

properties of our elements * * * its various attributes, such as intensity and quality. But this does not shake our faith in the validity of our general criterion of ultimates, for this second analysis is in no sense a continuation of the first process. * * * In the first analysis, we passed successfully from one process to another, finding in each new stage the explanation of the more complex one which preceded it. When we have at length reached a process which we cannot explain by any other *process*, our regress is finished, our element is discovered. Whatever analysis may now be possible will be entirely distinct from the first and will in no way affect its claim to be distinct."

The argument is ingenious, but misleading. Even if one grant Miss Talbot's contention that sensations, on the one hand, and qualities or intensities, on the other, are reached by different processes of analysis, it still remains true that the results of that second analysis may justly claim the title of 'element' rather than that of 'attribute.' But the entire hypothesis of a second analysis shows itself, on closer scrutiny, to be baseless. It is probably derived from the false analogy with an atom or with a chemical element, which, while physically and chemically unanalyzable, is obviously characterized by psychic attributes, such as weight and form, and color or odor. But just as a chemical element is not further decomposable and reducible to chemical attributes, so it is logically impossible that a psychic element should lend itself to further psychological analysis.

Introspection bears out this *a priori* conclusion. The analysis whose results are admitted to be elements of consciousness—that is, the discrimination within a complex percept of distinct sensations and affections—does not differ noticeably from the analytic study of its hues, intensities and forms, which, according to Miss Talbot, is a second sort of analysis. But if this 'second analysis' into attributes is indeed a mere continuation of the first, into sensations, then these sensations can no longer claim to be unanalyzable elements of consciousness. The only escape from this position would be by a return to the rejected theory that 'element' means, not an undistinguishable abstraction, but the simplest fact of real experience. In this case, however, as has been suggested, analysis has already gone too far, for even the combination of quality, intensity and extent which makes up a sensation, on the ordinary view, is an artificial abstract and not the simplest of concrete mental experiences. If elements are to be defined, on this principle, as the simplest factors of actual experience, then they can include nothing more remote from reality than ideas or images and emotions.

In truth, one cannot have it both ways: either the sensation has attributes, but then it is a complex, no element and has lost its excuse for psychological being; or the sensation is an irreducible and unanalyzable element, but then its simplicity is absolute, not to be trifled with, and not to be explained away by reference to any second process of analysis into elements, which yet are not elements, but only 'attributes,' 'aspects' or something equally vague and meaningless.

II.

The conclusion that an element of consciousness cannot possess attributes leaves untouched the question of the nature of the so-called attributes. For, however misleading the colors under which they sail, quality, intensity, extent and duration are nevertheless genuine factors of our experience. If the traditional classification is rejected, some other must be suggested in its place.

At the outset, duration must be sharply distinguished from its fellow-'attributes.' When it is said that sensations have quality, intensity and—in some cases—extent, the meaning is, that to have the sensation at all one must be immediately conscious of quality, intensity and sometimes of extent. But we are not by any means always conscious of the duration of a given sensation; on the other hand, we are notoriously oblivious of the passage of time in much of our sense experience. And yet always, whether we are conscious of it or not, the sensation has duration—that is, "it lasts a certain time."¹ Duration is not, therefore, an attribute, like the rest, by virtue of being a constituent of sensation, but is, as it were a reflective attribute, what Schumann calls a '*Beurtheilung der Dauer*.'² Moreover, duration, even in this sense, is not a purely psychic attribute, but belongs to physical as well as to conscious facts, and is in truth the characteristic of all serial phenomena. Of course, duration, besides being later predicated of an event of consciousness, may itself also be immediately experienced; and indeed such direct acquaintance is the basis of the later prediction. But duration is, in this case, distinctly a complex experience. Höffding³ has analyzed it very acutely into the factors of 'change' and of 'connection.' Certainly it lacks the simplicity of the attribute.

¹Titchener, *op. cit.*, § 8, p. 30.

²*Op. cit.*, p. 131. Schumann, curiously enough, treats all the attributes as judgments called forth by the 'einheitliche Empfindungen,' ignoring the immediateness of our experience of them.

³Eng. Tr. Outlines of Psychology, pp. 184-186.

Even the most ardent advocate of the traditional theory should, therefore, reject 'duration' as an attribute of conscious elements, for either it is an unpsychological attribute of phenomena in general, reflectively 'added' to the sensation, or else it is a complex psychic content. 'Quality,' 'intensity' and 'extent' must be differently treated. They are 'attributes' by virtue of being psychic contents, and if we refuse them the name we must fit them into some other appropriate corner of our psychological scheme.

The case of quality may be most readily considered, for already the universal habit of classifying sensations according to quality¹ and the admission by most psychologists that quality is the most important element have correctly suggested that quality is itself sensation. Titchener goes further. Besides reproducing Külpe's description² of quality as the 'core or kernel of sensation'³ to which the other attributes are referred as the duration, intensity and extent of a quality; and, not content with calling quality the 'most important and fundamental'⁴ and the 'absolute'⁵ attribute, Titchener says definitely: "It is quality which makes sensation an elemental conscious process." More than this, in his paragraph on the 'total number of elementary sensations,'⁶ he states distinctly that each of these 40,000 qualities is a conscious element, distinct from all the rest and altogether simple and unanalyzable. This reduction of quality to sensation-element accords with the plain results of introspection. Such 'qualities' as 'this blue,' 'this pitch,' 'this warmth,' are surely distinguishable factors of consciousness, though they are, of course, inseparable from certain intensities and—in the case, at least, of the color and the warmth—from certain extents. But if distinguishable, since they are also irreducible, they are by definition elements of consciousness.

Nothing forbids a similar treatment of intensities as sensation elements; but such a theory lacks even the virtual sanction of the authorities, and must, therefore, be more carefully considered. It appeals, in the first instance, to ordinary self-observation. Does not introspection clearly reveal that complex, sensational experiences differ in intensity as truly as they differ in quality? A very soft sound of a given pitch is as distinctly 'different,' though differently different, from a loud tone of the same pitch, as two tones of the same intensity but of discordant pitch. In the same way highly salted food differs unequivocally from that which is only slightly salted; 'brightness' as well as

¹ Ladd, *Elements of Psychol.*, 356; Baldwin, *Senses and Intellect*, 85.

² *Op. cit.*, § 4, 2.

⁴ *Ib.*, p. 77.

³ *Op. cit.*, p. 31.

⁵ *Op. cit.*, § 22, p. 67.

'blueness' is a direct, distinguishable element in a visual sense experience; and the loudness as well as the high C quality is a noticeable constituent of the auditory content. Of course, the blueness is more definitely named, more practically important and perhaps more affectively toned, yet it is not more undeniably present, as a distinguishable part of the experience.

To those who already virtually admit that 'quality' is itself sensation, an additional introspective argument will be found in the relation of intensity to quality in the visual series of greys. For here, as is generally admitted, intensity and quality coincide; a grey of lessened intensity is a grey of a different shade. This seems to show so close a relation between the two that the one may surely be treated as sensational element, if the other is.

Three objections to this doctrine must be seriously considered. The first lays stress upon the relative nature of intensity. "We estimate intensity," Titchener says,¹ "always by comparison with other intensities. Our use of terms indicates this. 'Blue' means something fixed and absolute, but 'large' is altogether relative and comparative." This distinction, which must certainly be admitted, does not, however, invalidate the claim of intensity to be regarded as an element of consciousness. It is a fact that we have few names for intensities, partly because there are so many of them shading almost imperceptibly into each other, and partly because only the greater differences of intensity are of practical concern to us through their connection with our emotional experience or through their harmful effect on our bodies. But if the possession of a name were the essential distinction of the 'quality' from the 'intensity,' then odors for the most part could no longer be classed as qualities, since they notably belong to the group of the unnamed. The relativity of intensities, though admitted in this sense, does not, therefore, debar them from coördination with the qualities, among the conscious elements.

It may be urged, in the second place, that intensity is too general a characteristic to be classed as sense element; that variations in degree are common to colors, sounds, odors—indeed, to all sensations; and that so common an attribute cannot itself be a sensational element of consciousness. Now, granting the assertion that intensity is a peculiarly 'general' sort of conscious content, this means only that one and the same sort of intensity accompanies all sorts of conscious ele-

¹ *Op. cit.*, § 26, pp. 77-78. This argument and those which follow are offered by their author as proofs of the relative importance of quality, compared with the other 'attributes.'

ments, and this hypothesis is not inconsistent with the teaching that intensity is a psychic element. This possibility need not, however, be discussed, for introspection does not bear out the observation on which it rests. Color intensities are not the same sorts of intensity as sound-intensities. Parallel with the difference between color and pitch, there is a difference between brightness¹ and loudness. So there is a difference between hardness—a pressure intensity—and the marked degree of a given sweetness. Intensities are really, therefore, as individual as qualities.

The last and most weighty argument remains. To quote again from Titchener, no distinct "bodily process in a definite bodily end-organ is connected with a sensation-intensity, since one and the same kind of bodily process may * * * be more or less well-marked (intensity of sensation) in different instances." Now to those who believe, with the writer, that observed distinctness is the ultimate criterion of psychological analysis, and that the discovery of assignable physiological differences may strengthen and supplement, but never contradict, the result of psychological analysis, this argument cannot be final, even if one admit what it implies, that there are no characteristic physiologic accompaniments of intensity. Such admission, however, is unnecessary; nor need we take refuge, to save our theory, in the unverified hypothesis, that contents which differ in intensity are conditioned by the excitation of different cortical layers. In truth, the physiological correlate of intensity is as readily assigned as the physical stimulus: amplitude of atmosphere or of ether-wave. Just as differences in the locality of nervous excitation correspond with differences in sense-quality, so differences in the degree of physiological excitation may correspond with differences in psychical intensity. Such distinctions of physiological intensity cannot, it is true, be connected with definite conscious states after the manner in which 'sense centers'—that is, quality centers—have been localized, but undeniably they exist and may be regarded as the physiological correlates of psychical intensities.

Thus the objections to the sensation-character of intensity lose their force, either because they involve unessential criteria of sensation or through contradiction of the results of introspection. Intensities, therefore, like qualities—loudnesses and brightnesses, like hues and pitches—take their places among the distinguishable elements of consciousness.

By almost precisely parallel arguments it might be shown that ex-

¹ In the sense 'color-intensity'; not in Titchener's sense 'grey.'

tensity, if regarded from a nativistic point of view, is itself an element of consciousness, whereas, to the empiricist, it is a complex of sensational elements, chiefly motor. In either case there is nothing gained by naming it 'attribute' of sensation. For if abstract irreducibility and distinctness be seriously maintained as the sole criteria of the psychic element, analytic psychology has no place and no use for the 'attribute' of sensation.

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IS THE MEMORY OF ABSOLUTE PITCH CAPABLE OF DEVELOPMENT BY TRAINING ?

The experiments the results of which I am going to report here were made in Berlin during the time from March to October, 1895, jointly by Dr. Victor Heyfelder and myself. I did not publish them earlier, because I expected to make a complete investigation into the memory of absolute pitch. After having given up this intention I shall describe those experiments separately.

The theoretically important question is: whether human beings are to be divided into two classes, one of them enjoying a memory of absolute pitch, the other wanting it, or whether there is but a gradual difference in memory of absolute pitch, some people needing more, some less practice to obtain an equal facility.

Should the former be true, we would have to assume that the first class possesses a physiological property, the lack of which prevents the others from acquiring that mental faculty. But it would be very difficult to say what kind of physiological property it might be.

In favor of the latter is the fact that everyone has a certain amount, however small, of memory of absolute pitch, being able to recognize and discriminate, *e. g.*, the sounds of a violin and a bassviol merely through the pitch.

Kries¹ indeed will not grant that this already may be called a memory of absolute pitch. But I do not see any reason for refusing this name in any case where the individual is *unable* to determine the pitch with an average error *less* than a certain interval, viz., a third. That there is no such reason is proved by our experiments, which show that individuals with not more memory of absolute pitch than above described by *systematical* and *sufficiently lasting* practice may be trained to meet the conditions of Kries. It may be mentioned

¹ *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, Vol. 5, p. 257-279.

that the *possibility* of such training by Kries and many others has been *denied*.

We used for our experiments tuning forks as well as a piano. In both cases we named the pitches not by their musical names, but by their vibration rates, a table of which we had lying before us. We began with few pitches and from time to time added some new ones, as is to be seen in the tables. Each tone was repeated as often as wished.

On the piano we began with 10 pitches at intervals of a sixth. When the number of different pitches reached 20, the intervals were major thirds; when 39, whole tones.

TONE PRODUCED BY TUNING FORKS; MARCH TO MAY, 1895.

		HEYFELDER.				MEYER.			
Correct Judgments %.		83	78	70	56	75	71	67	59
Number of Judgments.		136	365	457	91	137	364	460	92
Vibration Rates.	100	$\frac{7}{10}$	$\frac{24}{27}$	$\frac{21}{26}$	$\frac{4}{4}$	$\frac{6}{11}$	$\frac{17}{18}$	$\frac{17}{15}$	$\frac{3}{2}$
	122	$\frac{15}{3}$	$\frac{27}{8}$	$\frac{16}{12}$	$\frac{1}{4}$	$\frac{11}{2}$	$\frac{15}{1}$	$\frac{15}{5}$	$\frac{15}{3}$
	150	0	0	$\frac{11}{12}$	$\frac{1}{4}$	0	0	$\frac{23}{4}$	$\frac{4}{1}$
	188	$\frac{14}{2}$	$\frac{36}{8}$	$\frac{20}{12}$	$\frac{2}{5}$	$\frac{11}{3}$	$\frac{21}{5}$	$\frac{16}{5}$	$\frac{16}{5}$
	220	0	0	$\frac{10}{12}$	$\frac{1}{4}$	0	0	$\frac{26}{7}$	$\frac{0}{1}$
	300	$\frac{15}{1}$	$\frac{24}{5}$	$\frac{14}{5}$	$\frac{4}{4}$	$\frac{12}{5}$	$\frac{25}{5}$	$\frac{27}{7}$	$\frac{5}{5}$
	400	0	$\frac{42}{10}$	$\frac{24}{5}$	$\frac{1}{4}$	0	0	$\frac{22}{10}$	$\frac{4}{5}$
	480	$\frac{16}{5}$	$\frac{32}{10}$	$\frac{23}{5}$	$\frac{1}{5}$	$\frac{11}{5}$	$\frac{25}{10}$	$\frac{27}{10}$	$\frac{28}{10}$
	680	0	$\frac{34}{5}$	$\frac{30}{5}$	$\frac{1}{5}$	0	$\frac{17}{5}$	$\frac{37}{5}$	$\frac{7}{5}$
	800	0	0	0	$\frac{1}{4}$	0	0	0	0
	960	$\frac{16}{1}$	$\frac{29}{3}$	$\frac{14}{1}$	$\frac{1}{1}$	$\frac{14}{1}$	$\frac{22}{1}$	$\frac{20}{1}$	$\frac{20}{1}$
	1200	0	0	$\frac{11}{1}$	$\frac{1}{1}$	0	0	$\frac{26}{1}$	$\frac{11}{1}$
	1600	$\frac{11}{1}$	$\frac{17}{1}$	$\frac{11}{1}$	$\frac{1}{1}$	$\frac{15}{1}$	$\frac{23}{1}$	$\frac{27}{1}$	$\frac{27}{1}$
	2400	$\frac{12}{1}$	$\frac{18}{1}$	$\frac{11}{1}$	$\frac{1}{1}$	$\frac{11}{1}$	$\frac{23}{1}$	$\frac{27}{1}$	$\frac{27}{1}$
	3200	0	0	0	0	0	0	0	0
	4000	$\frac{11}{2}$	$\frac{19}{1}$	$\frac{18}{5}$	$\frac{1}{5}$	$\frac{14}{5}$	$\frac{21}{1}$	$\frac{17}{4}$	$\frac{17}{4}$

The fractions give the relation of right to wrong cases.

TONE PRODUCED ON THE PIANO; JUNE TO OCTOBER, 1895.

Number of different pitches.	HEYFELDER.		MEYER.	
	Number of judgments.	Correct judgments %.	Number of judgments.	Correct judgments %.
10	69	81	69	86
12	46	72	46	85
14	46	70	46	65
16	69	75	69	61
18	92	74	92	66
20	368	73	368	59
39	736	64	736	60

Even when we had the choice of 39 pitches, more than one-half of our judgments were correct, and errors surpassing the neighboring pitch on either side were quite rare.

We did not continue those experiments further, because the value of the acquired facility did not seem to us to correspond to the expense of time. Now, after several years have passed we have lost the greater part of what we had acquired, by the want of continued practice.

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PSYCHOLOGICAL LITERATURE.

Instinct and Reason, an Essay concerning the Relation of Instinct to Reason, with some special Study of the Nature of Religion.

HENRY RUTGERS MARSHALL. New York and London, Macmillans. Pp. vii + 574. \$3.50.

This work presents a most ingenious and interesting hypothesis, the fruit of fifteen years of special study and reflection, as to the relations and relative biological values of these two groups of mental processes. The work possesses a thorough-going quality, born of patience and sincerity, found only in works produced in a similar manner. Its first object was to present the conception of religion which it contains; but to this end it was necessary to treat of both instinct and reason, and the discussion of religion assumes a subsidiary place.

The method of the work is 'objective.' Like the investigations which resulted in the law of evolution, the method here subordinates the inner to the outer, the psychic to the organic, and construes all mental processes, even religion, in biological terms. The work accordingly does not concern itself with questions of origin. The law of evolution does not touch the question of origins, and is not a law of progress except for those whose desires and impulses lead them so to construe it. The empirical relations of instinct and reason, together with their biological significance and value, are here in question; and these problems are to be studied by construing wide objective groups of human and animal activities in the light of the biological doctrine of evolution. We are studying throughout the work what may or must be conceived, rather than what is—a task which, in all scientific procedure, goes before the work of verifying and establishing, and shades imperceptibly into it. The work presents something more than an unusually suggestive working hypothesis.

The book is divided into five parts treating of introductory conceptions, instinct, impulse, reason and certain relations between instinct and reason, respectively. First, as to method. While our point of view is similar to that which an utter stranger to our planet might be conceived to assume in order to arrive at some intelligible account of human and animal conduct—a purely objective point of view; nevertheless we are not far from the mental series at any time. The doc-

trines that mind acts on body, that body acts on mind, that both are aspects of one fact (epiphenomenon theory), and that the two series of events are simply parallel, are passed in review and criticized. Psychic states constitute part of the conditions of processes in the motor centers of the cortex, and we are forced to one or other of two conclusions—either the psychic effect alters the sum-total of physical energy in the brain (which cannot be accepted), or there is something psychic in all causation. Our brain processes, moreover, constitute a group of mental states within that larger group called objects of the outside world, and it is between this small group within a group of mental phenomena and the remainder of the content of consciousness that the causal-interaction-theory asserts a causal relation. But this strange hypothesis is not necessary: another—that of parallelism—is equally tenable and serves our purpose well. This theory assumes a psychic somewhat, which the author calls ‘mentality,’ coincident with each neural activity within us. Where neural structures organize into a system, and neural activities become continuous, mentality likewise organizes into a system and becomes self-conscious. The psychic phenomena of double consciousness, hypnotism, amnesia, and hysteria are coincident with disintegrated neural systems. The Ego of psychology is ‘an unanalyzable whole, and part of consciousness’: “the ego and the field of inattention, therefore, would seem to be one and the same thing, the differences in the application of the terms being determined by differences in the point of view.” Neural systems organized under one preëminent system constitute the brain, and under certain conditions may be functionally separated from their connection with the preëminent system. The destruction of ‘association fibers,’ the bearing of neuro-psychological rhythm, as developed differently in different systems and at different times, upon the phenomena of normal and disunited consciousness; and the differences between this view and the old ‘mind-stuff theory,’ are discussed in some detail. The discussion of parallelism closes with a few brief but interesting metaphysical suggestions in the form of questions. The entire chapter, although of course not absolutely new, is vigorous and courageous.

The last discussion of Part I. takes up general definitions of instinct, habit and reason. “Instincts are forces * * * which appear in us because we are organisms; * * * which are more or less thoroughly coördinated” (p. 68). They have been acquired by the race “because in the long run they have been, as they in general still are, valuable to life under the conditions which normally arouse them.” (p. 70). Habits may be called pseudo-instincts which have been

learned, not inherited, by the individual. Reason, on the other hand, is "that which leads us to adapt ourselves to new conditions, to guide and change the actions which are determined by instinct, and is what we may call the verdant factor in psychic life" (p. 70). Reason covers intelligence—"we act intelligently when we would override and vary the actions to which we are led by our organic instinct" (p. 80).

Part. II., Concerning Instinct. Instinctive actions are not dependent in any degree upon our appreciation of the advantages they bring us; and we are here not concerned with the question as to how they originated. In any cell-aggregate two influences will always be operative in the determination of conduct: first, "the elemental variant influence which would lead any cell to act for itself alone," and second, "the modifying influence from the aggregate of which the stimulated cell is an element." In the higher forms of organic life, those activities which are determined by the influence of the aggregate are instinctive, while those which are determined by the elemental variant influence are reason (p. 109 ff.). All congenital series of actions determined by the constitution of the organism, and subserving definite biological ends, must be classed together as instincts (p. 87); and the presence of some biological end subserved by the instinctive activity is the all-important thing. Determination by organization, definiteness of reaction, should not for a moment be made a differentia of instinct (as by Professor Morgan) (p. 90). Fixity of reaction is only an ideal seldom reached, but the biological end is fixed, and this is the objective mark of instinct. The subjective mark of instinct is the absence of any influence from the conception of the biological end. Not the particular act, but the *trend* of many is the truly instinctive thing; the former varies, the latter is constant. Impulse is a plain state due to the inhibition of instinct-actions, to the failure to carry out distinct images of motor activities. Impulse should always have a subjective significance in psychology.

The term instinct applies, also, to the activities of parts of organisms, where these are in unison with the activities of the entire organism and occur in response to regularly recurring stimuli, as, *e. g.*, the activities of the heart, lungs, etc. All the instinctive activities are automatic, and their psychic concomitants merely form part of the unanalyzable psychic mass called the Ego. Fundamental in organisms are the instinct-actions toward advantageous stimuli, and away from disadvantageous stimuli. Instincts are classified into three groups: those tending to the preservation of the individual, those tending to the pres-

ervation of the race (sexual instincts), and those tending to the preservation of social groups to be found among many species of animals.

First, those tending to preserve the individual. Owing to the uniform dependence of organisms on their environment, certain instinct actions are universal, and receive definite names. The corresponding instinct-feelings are emotions such as joy, sorrow, dread and relief (p. 113). Corresponding to instinct-movements toward objects and other organisms, love appears subjectively; corresponding to movements away, anger and fear; to the instinctive functional adjustments of the sense organs to objects, surprise. Another group of instinct-actions is Professor Baldwin's 'self-exhibiting reactions'; but this group is so rare, irregular and weak that the corresponding instinct-feelings fail to be realized. Marshall does not favor the 'back-stroke' theory of the emotions; he assimilates emotional expression and emotion to the categories of 'instinct-action' and 'instinct-feeling.' Differences of muscular reactions in expression do not make the differences in emotional states which the back-stroke theory would lead us to expect. The emotion is the psychic coincident of the total reaction of the neural system concerned at the moment of emotional expression. In general, all individualistic instincts must be subordinated to those which relate to the persistence of the species to which the organism belongs, just as the reactions of the elementary cells for their own benefit get subordinated to reactions for the good of the organism as a whole.

Instincts relating to the preservation of the species are the second group considered: these are the instincts pertaining to reproduction. Here come up for consideration such topics as sexual pursuit, self-exhibiting reactions that attract, mating, the protection of mother and young, and instincts of the 'deferred type.' The forms in which these groups appear in the higher organic life of man are discussed at some length. Individual variant instincts may become rational ends, as when a student or professional man suppresses the reproductive instincts in the effort to secure personal ease, or freedom from the cares of ordinary family life. "Evidently, we see here very clearly the relation of intelligence, of the reasoning process, to elemental variance" (p. 138).

The third group consists of instincts relating to the persistence of social groups. Here the different forms of coöperative conduct, such as attacks made in combination by ants, wolves and men, herding for facility in finding food, herding for defence and offence. In man we see forgetfulness of self, family, etc., in times of war; monogamy; personal loss suffered rather than commit murder; hunger rather than

theft; benevolence and art instincts tending to the advantage of the race rather than to that of the individual. In all this the individual's advantage is either indirect or entirely absent. Here, intelligence and reason interfere only in the interests of unpatriotic tendencies, violation of the marriage relations, etc. Ethical impulses are instinct feelings which have no individualistic significance. The inhibition of impulses to kill enemies and to commit adultery is due to instinct—violators are simply atavistic. Sympathy and pity, philanthropy and art are here discussed. But in this higher sphere, Nature's problem becomes complex; the same sets of circumstances can seldom recur; consequently only certain trends of action persist; but thought of the trend of instinctive action destroys the force of the impulse. Individualistic instincts reassert themselves in killing, licentiousness and theft, and in all of this the effects of reasoning are most marked. But there is a possible serious hesitancy, a sincere doubt, solved by rational argument.

Apart from these groups of instincts, those which have to do with the relations of other instincts, such as imitation and play, are mentioned. Imitation belongs to a complex instinctive type, and is not identifiable with the 'circular process' which Professor Baldwin would have us call imitation.

Throughout this discussion, the assumption has been determinant that the race instincts develop out of and upon the individualistic instincts, and that the social instincts develop out of and upon the other two groups. The subordination of the first group to the second and of both to the third is a necessity of the race and a universal fact. Hence the conception of a hierarchy of instinct-efficiencies established and preserved by Nature by the method of natural selection.

But how is this hierarchy to be established and preserved in the individual? Granting that those in whom it does not appear tend to disappear from society, it is more conceivable that all should disappear than that such a hierarchy should spring up by chance. Can the social organism be said to exert the necessary control over the individual? Chapter VII. is devoted to the task of showing that society, although organic, is analogous merely to those low forms of organic life which grow by accretion of like elements and which exert but little influence, as organisms, upon the individual elements. It is a matter of indifference whether we compare society to psychological or to physiological organisms: the two correspond, or rather the one is dependent upon the other (p. 183)—a statement which does not seem perfectly consistent with the picture given on page 34 of the relation

of one series to the other. Why are societies analogous to low rather than to high forms of organic life? The reasons given in the work do not seem at all adequate. For example, among others, the point is made that in the higher organisms the life of the parts (the heart, *e. g.*) depends upon the life of the whole, while in society individuals live on whether the social organization lives or not. Now it seems as though the judicial or legislative functionaries of society would be more analogous to the heart than is the individual citizen. It is a question whether the absolute separation from each other of the individuals composing society would not involve their death *as social units* just as truly as the separation of the cells composing an organism involves their death *as cells*. It seems like bad logic when the author reasons from this fancied analogy to the conclusion that there is little likelihood that the race will ever attain to high social organization; and again, when he reasons that if there were such a thing as a social consciousness, the individual could no more know it than a sensation can appreciate our higher life of reflection. This chapter's significance for the argument is its rejection of the thought that social suggestion and control preserve the hierarchy of instinctive efficiencies which the theory demands.

In the next chapter, the eighth, the tendency to variation in social aggregates is represented as excessive. Under the special stress of unusually strong stimulation, and wherever the restraints due to social instincts are removed or weakened, the individual tends to act as an individual. Reasoned processes are the latest and highest developments of this variant principle; but ratiocination is not an important determinant in the struggle for existence (p. 204). Racial and social instincts can be accounted for on the hypothesis that the result on the whole is better individual adaptation for existence in an environment. But we cannot help recalling attention to this point, for natural selection does not seem self-consistent here. What was, to start with, a struggle of the individual with his *individual* environment seems to be unconsciously understood, when the argument demands it, as a struggle of the individual with the environment *of the social group*. The discussion, not being concerned with origins, does not tell us why the individual stops struggling with that part of his environment constituted by the remainder of his social group, or, in other words, how he comes to identify himself with the social group to such an extent as to fail to discriminate between the two environments. Professor Huxley maintained that an egoistic struggle for existence could never become so intense or far-sighted as to develop into an altruistic sacrifice

of self: the survival of the fittest is a law of individual survival, and we do not know that any one has shown how it can become a law of the survival of social groups. In the sphere of psychological, ethical and social evolution, the law of natural selection explains very little. The discussion, however, establishes the need of some controlling instinct to preserve the hierarchy of instinct-efficiencies, and the point which I have above disputed is not absolutely essential to the argument.

This controlling or governing instinct is to be religion; and chapter nine discusses the question, Is religion instinctive? Actions expressive of religion are organic, and subserve biological ends, and these are the marks of instinct. It is not necessary that they should be definite and regular: the higher instincts are rarely so; and we should consider the fact that religious activities are practically universal in the race, although it is not necessary to the argument that they should be entirely so. The function of religious expressions is, to restrain the tendency to over-variation from typical forms of reaction and to emphasize the order of impulse efficiency developed above. To understand this, we should consider instinct-actions, and neglect both origins and beliefs. Seclusion, fasting and self-torture are three typical forms of religious expression. They are not in themselves advantageous to the individual nor to the race, rather the opposite, and yet they have persisted. They have persisted because they tend to produce a quiet of soul and a reduction of physical vigor which favor the hearing of the 'voice' within which is the voice of our racial and social instincts. The fact that religious illuminations seem to come from without is due to their hallucinatory character. Exhaustion from hunger, fatigue and self-torture make the zealot peculiarly susceptible to hallucinations. By these activities the individual instincts are suspended and the social and racial instincts are permitted to make themselves felt. There may have been, must have been a time when the racial (sexual) instincts needed this religious support in order to the perpetuity of the race and its proper development, and hence the various forms of phallic worship which have appeared in the past. Submission to the Power that guides the universe is involved in all three forms of religious activity.

Prayer persists because, in the silent seclusion of the closet, with the attention fixed upon some concrete or ideal object of wide import, the tendency to individualistic reaction is repressed and the suggestions from man's deeper nature are emphasized. Sacrifice has a like value. Celibacy and pilgrimages either produce the same effects

upon the soul or favor those forms of religious expression which do produce them. The efforts of those who hear the 'voice' to enforce their admonitions on others take the forms of teaching, temples and mysterious ceremonials. Purifications and lustrations, initiations into religious brotherhoods, stimulations to the æsthetic sense, such as processions, pageants, songs and temples, are all discussed in this connection. The analysis of these religious phenomena is very suggestive; but it is undertaken in order to show that religious exercises subserve biological ends, and many will feel, doubtless, that the analyses appear plausible only *after* we have assumed that religious exercises do subserve biological ends. Our problem is that of conceiving, rather than that of demonstrating, relations, and it is a fact that conversion and other religious phenomena seem to be empirically connected with puberty and the development of the social and racial instincts; but if the discussion of the function of religion were intended as an argument to show that religious exercises subserve biological ends, it could scarcely stand before the charge of reasoning in a circle. And yet, unless we take this discussion as an argument (as we cannot do), the author has not shown that religion is an instinct. Perhaps many, again, will feel that the organic character of religious activities was not clearly enough established to warrant the conclusion based upon the point.

Part III., Concerning Impulse. Impulse is the subjective aspect of the objective inhibition of an instinct-action. The analysis of craving and desire in the light of this definition follows (p. 348). Every man represents a hierarchy of impulses corresponding to the order of subordination of the instincts, and this gives his ethical standard for the moment (pp. 358-362). Wherever the efficiencies of opposing impulses are equal, my 'egohood' decides, and I will which I shall follow. (The ego is identical with the field of inattention.) We never act contrary to the ethical standard of the moment, but this varies from moment to moment and from man to man. For each man at each moment there is an individual standard of the moment; but a relatively stable individual standard arises in moments of reflection and restraint from immediate action. This forms the basis of mature ethical judgment, a third standard; but this one also changes with the environment and with habit (p. 372). Social influences, however, give rise to the conception of the ethical standard of the most highly moral man of whom we can conceive, and this standard, though variable, is relatively stable.

This standard is not, however, the basis of conscience. "Consci-

ence is the protest of a persistent instinct against its inhibition by a less persistent, but, for the moment, more powerful force" (p. 388). Conscience is itself not an instinct, but a relation between instincts (p. 408). Besides the ethical conscience we have also patriotic, æsthetic and various pseudo-consciences. True conscience tells us of instinct, while a pseudo-conscience tells merely of organized habit (p. 395). Conscience, the sense of duty, remains always the same, but we find a new development of conscience in connection with the development of the religious instinct (p. 397). "The existence within us of a sense of duty as it is experienced in its fullest form, is conclusive evidence at the same time of the existence within us of the religious instinct" (p. 398).

Part IV., Concerning Reason. By this process we are to understand "the capacity found in animals, and in ourselves as animals, to act apparently in opposition to, or, at least, without reference to, instinct" (p. 414). The distinction is made between 'reasoned' or 'intelligent actions' and 'reasoned' or 'intelligent feelings.' The pursuance of future ends and the choice of means for their attainment are the marks of reason. Reason is marked by choice (an objective *result*), and choice is the evidence of will on the psychic side both in ourselves and in the lower animals. Reason in germ or in complex form must be a process as wide as psychic life. Reason and will are indissolubly connected, all rational processes ending in will, and all volition being at the moment of volition rational (p. 424).

All reasoned action, again, must be 'referred back' to instinct-action—it is action according to an older, simpler and more highly organized instinct, relating only to the stimulated element of the organism when some more recent, more complex and less highly organized instinct relating to the organism as a whole or to the social organism would have asserted itself, had not immediate and decisive action been made necessary by the nature of the stimulus. "All reasoned actions must also be referred back to and appear as modes of that simplest of all phenomena of activity, the reaction of a single cell to the stimuli from its environment" (p. 438). The distinction between instinct and reason is really not fundamental; it is the distinction between a typical reaction and a variant reaction. Reason represents the influence in organic life which breaks down our complex inherited tendencies.

Consequently, our inherited impulses are a safer guide to right conduct than reason, as a general rule. That instinct is of higher import than reason, is the burden of nearly one hundred pages at the close of the work. But the ethical impulses are not instincts accord-

ing to the author's definition—they deal with relations between instinct actions—and religious expressions are instincts which have to do with the preservation of a proper order of instinct-efficiencies. Hence arise the last problems of the discussion, viz., the relations of morality to religion on the one hand, and of both to reason on the other. As to the first problem, morality is practically ineffectual except it be religious, although, in our theorizing, ethical conceptions are the logical basis of religious opinions, so that the latter grow in adequacy with the growth of moral experience and thought. Hence the importance of the utmost conscientiousness in life, if we would not fail of the best attainment possible for us. It is possible for an intensely religious person to be immoral, and hence such anomalies as the prayer of the thief for success in his present attempts to filch his neighbor, etc.

As to the relation of religion to reason, the accumulated wisdom of the ages is, on the face of it, probably of greater worth than the thought of any single individual in any particular community at any particular time. We ought, in the interest of progress, to listen to reason, to reason freely and fearlessly, indeed, and to take risks; but we should never forget that in doing so we *do* take risks. In searching for a rule of conduct we have the following as a final word: "Act to restrain the impulses that demand immediate reaction, in order that the impulse order determined by the existence of impulses of less strength, but of wider significance, may have full weight in the guidance of your life. In other words—*Be Religious.*"

The theory thus presented with as little comment as possible speaks for itself, but we desire to ask a few questions. First, as to the objective method adopted. Does it not make it impossible to use some facts and distinctions which are essential to the discussion? At some places the author himself has departed a little from the rule of perfect objectivity to consider subjective marks of instinct, etc. One asks himself, for example, for the subjective difference between instinct and reason. If we regard the two marks of organization and subservience to biological ends purely in the objective, why may we not show that reason itself is instinctive? Construing these marks objectively simply, one feels that it would be easier to show that reason is instinctive than that religion is. Indeed, the rational process does creep into the tents of instinct very frequently, and it seems to be merely the necessity of a 'variant factor' in the theory that prevents reason from stalking boldly into the main street of the opposite camp.

Again, this hierarchy of instincts and impulses, which seems so definite in its subordinations and coördinations when considered as an

objective phenomenon what is it from a subjective point of view? Some will feel that the author's picture is as much removed from mental experience as are, *e.g.*, the rules of the syllogism in formal logic—I mean, of course, the mental experience of the race as well as that of the individual. To illustrate my meaning, take the order of appearance of the different ranks of instincts and impulses, as depicted by the discussion. Is it true that the racial instincts appear after the individual and before the social, or that the social appear as far behind the individual as the theory demands? It seems more than questionable to some. Moreover, the discussion assumes that there is always in the individual a strong tendency to revert to the individualistic type of reaction: the biological end of religion is to counteract this tendency. But it is an open question whether the individual is thus individualistic at bottom, as a matter of psychological fact. The genetic distinction seems to some to be between the more and the less rational. Professor Baldwin and others have watched children with these various theories in mind, and have been surprised to find what may be called social reactions (using the terms in Mr. Marshall's sense) as early as individualistic reactions, after excepting those which are purely organic and which occur before the child can be said to be any more psychic than a plant. There seem to be many reasons for believing that this is true of the race as well.

Again, how many of the author's social reactions are instinctive, and how many are due to suggestion and imitation? Shall we include the latter social reactions in the class of instincts? Mr. Marshall seems to say so. But do they not belong to the category of variations, leading to the modification of old ways of reacting to stimuli? Are we to broaden our notion of instinct so as to include the organized reactions of the social group to its environment, as well as those of the individual to his? If so, then Professor Baldwin may grant that imitation in this sense is a complex instinct (as Marshall maintains) without abandoning his own position that it is not an instinct. It comes to be a question as to the meaning of instinct, and perhaps some will feel that Mr. Marshall makes the word far too wide.

Lastly, as to Reason, the 'variant factor in psychic life.' Does not every instance of reacting to old stimuli in new ways, of adaptation or accommodation, belong to the category of reason as here understood? Reason covers intelligence, and the marks of both are selection and biological aim (as objectively discoverable in the results of the act). Mr. Marshall says that reason must be coextensive with psychic life. But what of those primitive acts evidencing selection and aim, which

give rise to so many other instincts—*e. g.*, the expanding and contracting movements which many assume to be the organic correlatives of pleasure and pain? These are classed by our discussion as instincts (p. 109ff.). They must belong to both categories, as the author uses them. This same difficulty appears in the analysis of reason later in the work. Reason is the variant factor in psychic life; but in discussing the subject on page 448 we read that variation is sometimes 'produced immediately as the result of a very forcible stimulus,' and then it does not 'involve any previous effects upon consciousness at all'—*i. e.*, it is not instinctive. Lower down, on the same page, we read that "all variation is determined finally by instinctive reaction, divergences being due to differences of width and complexity of the organic systems involved." On pages 79 and 80 we read that activities determined by the influence of the aggregate are instinctive, while those due to elemental variation are 'reasoned' in the higher forms of life at least; but page 439, "the distinction between instinct and reason is indeed not fundamental." On page 449 the basis of the emphasis of the partial impulses connected with variation is the *stimuli* which determine the impulses, "and here we find ourselves dealing with the essential processes of reasoning." The difficulty here is not merely a verbal one. Reason tends always in the author's discussion to disappear in instinct; but if reason is instinct, and if variation is reason, then how is evolution possible? I do not see how we can determine the relation of instinct to reason without considering the question of origins, which the author everywhere rules out of the discussion.

We wish Mr. Marshall had discussed the 'circular reaction theory' of the biologists and of Professor Baldwin and others. In this circular process which they understand to be the law or essential method of organic and of psychic life, there are both aim and selection, both organization and biological end; but it seems to fall into both of Mr. Marshall's categories. If this process is defined as one which repeats its own stimulus, and if this is the typical form of all psycho-physical reaction, then socially coöperative conduct ought to develop in organic life side by side with individualistic conduct. In other words, if the circular process is a true conception, I do not see how Mr. Marshall's view of the relations between the various instincts can be maintained.

The author regards reason, will and choice as coextensive with psychic life; but is not this a needless broadening of the meanings of terms?

I may have failed to grasp this complex and interesting theory in

its details; but, if not, it would seem clear that the method of the work is too 'objective' (it is deductive), and that the terms of the discussion are used too loosely.

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La Psicologia Contemporanea. GUIDO VILLA. Turin, Fratelli Bocca, 1899. In Svo. Pp. xvi+660.

The object of this volume, as explained by the author himself, is to give a clear account of the present condition of psychological studies in those countries where the scientific study of the mind is most in favor, as in Germany, in England, in the United States and in France (preface). The author apologizes for not having said much of his own country. He seems to believe that, thus far, the contributions of his countrymen to the advancement of scientific psychology have been scanty and insignificant. Signor Villa remarks that most of the Italian psychologists are, properly speaking, philosophers; that the dominant tendency in psychology is still that of the 'inner sense' which goes, with certain authors, as far as a purely spiritualistic conception of the mind. It is only a short time since works were being published on physiological psychology, like those of Sergi, De Sarlo, Buccola, Faggi. But, he concludes, the new psychologists, by going to the opposite extreme of the spiritualistic philosophers, seem to be coerced into such an intensity of materialistic beliefs as to lose the equilibrium of feeling required for dealing scientifically with the facts of mental life (pp. 78-79). This, with the exception of a few scattered references to books published in Italy on various psychological topics, is about all he says concerning the Italian psychologists, in a volume of more than 660 pages.

For such a shameful lack of enthusiasm over the work of the Italians in the field of psychology, Signor Villa has been very severely reprimanded by Professor Sergi. (*Il Pensiero Nuovo*, Vol. IV., 1899.) Sergi claims that Italy can stand comparison with any other country in regard to psychological work. As a proof, he recalls the fact that a laboratory of experimental psychology was founded at Reggio Emilia by Tamburini as far back as 1880, that psychological laboratories were soon after organized in the Universities of Naples, Rome and Turin, in connection, respectively, with the chairs of psychiatry, anthropology and physiology; that since 1879 the first work on physiological psychology was published in Italy by Sergi himself, the same work being later on translated into French by Ribot and Es-

pinas and published in Alcan series. Sergi further recalls the names of the most prominent contributors to the advancement of experimental and comparative psychology in Italy: Vignoli, Lombroso, Morselli, Buccola, Mantegazza, Mosso, Luciani, Tanzi, De Sanctis, Patrizi, De Sarlo, Ferri, Ferrero, Sighele.

We are willing to concede that Signor Villa has somewhat exaggerated the insignificance of the Italian contributions to scientific psychology, probably for the purpose of pleasing certain old caryatides who control the distribution of university chairs. We will also admit that it cannot be asserted, as Villa does, that the tendency still prevailing in Italy in the study of the mind is that of the 'inner sense.' This is only true in reference to a few men who teach psychology as a part of philosophy in some of the universities. These fossils, however, cannot be made to represent the whole movement of studies and research in psychology which is growing, outside of the philosophical faculties, chiefly in connection with the chairs of nervous diseases and physiology. But we cannot share Sergi's indignation at Villa's alleged lack of patriotism. There should be no 'chauvinisme' in a discussion of this kind. Nobody can deny that scientific psychology has found, even in Italy, a number of competent students. But we cannot seriously claim, as does Sergi, that Italy stands second to no other country in the line of psychological work. Psychology has not even gained in Italy a recognition as an independent 'natural science' in the university curriculum. It is still a branch of philosophy. Consequently, there cannot be specialists devoting their life to psychology alone. Occasional psychologists, however intelligent they may be, are recruited among physiologists, neurologists, anthropologists. Thus, psychological research appears to be a sort of by-work. There is absolutely no sign in Italy of a movement of psychological studies and researches comparable to that flourishing in Germany or in the United States. Partial attempts, scattered and isolated efforts, in a word, something which is undoubtedly growing, but is still very immature; this is the real condition of psychological studies in Italy to-day. The fact recalled by Sergi, that a psychological laboratory was founded in Italy in 1880, is not a conclusive argument. The important thing is not to have so-called laboratories, as a novelty imported from abroad through a sort of scientific snobbishness, but to have students who do nothing but psychological work and who make discoveries of new facts. What are, then, the original contributions made by Italian psychologists which can be said to mark a step onward in the building up of scientific psychology? Is there any Italian work

to be compared to those of Wundt, of James or of Ribot? Of course, I am speaking of purely psychological works. Golgi, Luciani, Mosso, Morselli—men of whom Italy is justly proud—cannot be considered as psychologists as long as physiology and psychiatry are to be looked upon as sciences totally distinct from psychology.

Signor Villa's book is a work of popularization. If advanced students and trained specialists have nothing to learn from Villa's résumés, beginners will find it a useful guide to the study of psychology. In the conditions now prevailing in Italy a book like this may undoubtedly help to arouse interest in psychological research, to extend the circle of psychological students, to bring the last results of experimental work abroad within the knowledge of a wider range of persons. Such a work had never been attempted in Italy. We are far from saying that Villa has succeeded in his difficult task. He is undoubtedly a conscientious worker, but sadly lacks the talent of distributing his subject-matter in the most convenient and suggestive form. The book is, therefore, full of unnecessary repetitions, it is heavy and cumbersome, its reading is tiring through prolixity and overabundance of 'historical stuff.' But, in spite of that, Villa's patient and truly meritorious effort deserves the warmest encouragement, and we cannot help declaring that Sergi has been utterly unjust in accusing Villa of ignoring the laboratory and of being a 'dilettante.' That Villa is fairly well informed of the results of experimental work and of the physiological facts bearing on psychological research is abundantly proved by his chapter on 'Psychological Methods,' and by the clear account which he gives of the recent discoveries in nervous histology by Golgi, Ramon y Cajal and others, in the chapter on 'Mind and Body,' one of the best in the whole book.

The following are the general headings of the chapters: Introduction; I., Historical Development of Psychology; II., Conception of Psychology; III., Mind and Body; IV., The Methods of Psychology; V., The Psychical Functions; VI., Consciousness; VII., Psychological Laws; Conclusion.

Signor Villa is thoroughly acquainted with German psychological literature, especially with Wundt's works. He gives, on the whole, one of the best résumés of Wundt's doctrines as unfolded in the three standard psychological works of the great German master and in all his monographs published in the '*Philosophische Studien*.' Especially worthy of notice is the résumé of Wundt's theory of Will (pp. 432-438); all the more so, as Wundt's theory of will is one of the most important elements of his interpretation of the facts of mental

life and cannot be found in a coherent and unique statement; but it is to be reconstructed from nearly all his works, and chiefly from the 'System der Philosophie,' the 'Grundzüge der Physiolog. Psychol.,' and the 'Grundriss der Psych.' Villa is also well acquainted with French and English literature. But he is a determined follower of Wundt's doctrines. Perhaps his admiration for that powerful intellect carries him too far beyond the limits of 'rationabile obsequium.' Wundt's doctrines are for him the alpha and the omega of psychology. He tenaciously clings to the presupposition of 'psychophysical parallelism,' but fails to understand that a provisional empirical assumption, justified only by the adoption of the 'natural science' standpoint in psychology, cannot be transformed into an imperative dogma without overstepping the boundaries of science and running into metaphysics. He says (p. 413) that there is an *absolute* difference between the physiological phenomenon and the psychical process. But, by emphasizing the hiatus between the causal series, by vigorously asserting the irreducible difference between the elementary facts of both series, he helps to accentuate what has always been the weakest point in Wundt's system—*i. e.*, the impossibility of conceiving a 'parallelism' where experience shows 'dependence' of one series (the psychological) upon the other (the physiological). Parallelism presupposes the independence of the two orders of fact. But what becomes of the psychical process if the nervous system disappears? The truth is that the assumption of a psychophysical parallelism, alleged to be a merely empirical statement of facts to be provisionally and uncritically accepted as the starting-point of scientific psychology, has resulted, in the end, in a desperate attempt to preserve, in a new and insidious form, the postulates of spiritualism. When disfigured through dogmatism and forced into the turbid region of metaphysics, the principle of psychophysical parallelism must necessarily end in a puzzling enigma. If, as Villa declares, the origin of the mental fact coincides with the origin of life on earth, so that the two series of facts—the mental and the vital—reveal their alleged parallelism throughout the whole animal series (p. 656); if we can explain the biological phenomenon as a result of highly complex chemical processes, which in turn may be traced back to the general laws of physics (p. 658); if, on the other hand, we cannot explain the elementary psychical fact as the result of the same physico-chemical agencies producing life (*ibid.*); then the origin of the mental fact remains unexplained as something which springs up *ex nihilo* while life, its concomitant, has definite antecedents. We cannot escape the 'impassé'

without prolonging the psychical series beyond the limen of life into the inorganic world, just as we prolong the biological series down to the lower plane of chemical processes. We must, in other words, attribute to the inorganic world some sort of unconscious mentality. Thus, when pressed too far, the principle of psychophysical parallelism leads directly to some new form of animism, hence to pure mysticism.

But this is not the place for discussing, in an episodic way, such momentous problems. We will simply add that Villa does not seem to be acquainted with recent American literature as well as with the German. Of Professor Baldwin's works, he seems to know only the 'Handbook' thoroughly. The brilliant studies on 'Child-Psychology' seem to be known to Villa only by the title (pp. 84, 89). He is ignorant of Professor Baldwin's most recent work 'Social and Ethical Interpretations in Mental Development,' thus missing one of the most important contributions of American thought to the advancement of both psychology and sociology, a work which, together with 'Les Lois de l'Imitation,' by Tarde, marks a critical moment in the growth of social science. I have also noticed lack of exactness in biographical information regarding prominent American psychologists. For instance, he gives Professor Münsterberg (pp. 86, 125) as lecturing at Freiberg, and Professor Baldwin (p. 83) at Toronto. The ignorance of Tarde's and Baldwin's works accounts for the extreme vagueness and confusion we have noticed throughout the book in regard to the conception of social psychology and to the relationship of social psychology to sociology.

In conclusion, we will say that Signor Villa's book, taken all in all, is a conscientious work which, despite the author's most decided infatuations for certain deceptive Wundtian formulas, might become a very useful guide to beginners, if the author, in a new edition, would use the scissors freely in order to suppress all the unnecessary repetitions which make the book so voluminous in its present arrangement. A carefully prepared index would very greatly increase the usefulness of this work.

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The Elements of Sociology. FRANKLIN HENRY GIDDINGS. The Macmillan Co., New York and London, 1898.

This volume "is not an abridgment of the author's 'Principles of Sociology,' but is a new book." To the psychologist the most sig-

nificant feature in the work as compared with the 'Principles' is the increased prominence given to social psychology. The 'Principles' devoted a large space to discussion of the scope and method of Sociology. The present work makes a great advance toward organizing all the manifold phenomena with which Sociology has attempted to deal, and viewing them as manifestations of a single principle, which, it is needless to say, is that of 'consciousness of kind.' Whether sociologists are likely to take kindly to this tendency to make their science essentially a Social Psychology is for them to say, but it cannot fail to interest the psychologist.

As in the 'Principles' so in the 'Elements,' the author does not seem to recognize any more recent psychology than that of Mr. Spencer and the associationists. "The unit of investigation in the study of consciousness is sensation, which is the simplest of all mental facts." But the most serious objection to the author's central principle seems to me to be that it is a clear case of the psychologist's fallacy. It not merely makes the whole motor force of human societies pre-eminently cognitive rather than impulsive in character, but it assumes that the like-mindedness by which people become co-workers is the product in large measure, at least, of their recognition that they are alike. To put it in a form which is more extreme than Prof. Giddings' statement, but which after all is quite in the spirit of his general thesis: people have common interests because they discover they are like-minded, instead of discovering that they are like-minded because they have common interests. The primacy of the intellectual or of the impulsive aspect of consciousness is the matter at issue, and the biological evidence seems to point increasingly to the latter alternative. Some of the particular illustrations of the power of 'consciousness of kind' strike one as remarkably devious paths for explaining simple facts. Thus, for example: when two strangers meet unexpectedly "there is either a shock of unpleasant feeling or a certain thrill of pleasurable feeling." "Now the feeling of shock surprise, anger disgust, which may happen to be the experience in the case is beyond doubt due to a very complicated impression of unlikeness which the stranger makes." Even the psychologist who will have naught of Darwin or James in his theory of emotions would be loath to trace all disagreeable reactions to a perception of unlikeness. Indeed Prof. Giddings goes on in the same paragraph to suggest the simpler explanation without any apparent consciousness that this is the case. "The man's appearance as seen with the eye may be repellent or threatening, his voice may grate repellently on the ear." A threatening appearance, a grating voice may

be just our own most prominent characteristic; they will not be any the more pleasurable in a stranger on this account. We dislike the threatening appearance because of the anticipated pain, or because its past associations, individual or hereditary—not because of its unlikeness. And as regards children, it is the familiarity of objects or persons, or their likeness to those objects or persons with which he is familiar, not their likeness to himself, which occasions pleasure. The child who has never seen a negro may be at first afraid; but the child nursed by the negro 'mammy' has no such experience. It is because the negro is unlike the other persons of its acquaintance, is unfamiliar, that the child in the former case feels fear. It is the common *interests* of the primitive family which make the kinsman dear and the stranger an object of suspicion.

Another case in which a devious instead of a simple method of explanation is followed, appears in the account of belief. This is defined as "the confident expectation that what we desire will come true; that what we find extremely interesting in accounts of the past were true." "This confidence we feel because in a majority of instances the things we have desired and striven for have been realized." This seems to me an attempt to explain a fact of social psychology by an individualistic hypothesis. Belief as signifying the acceptance for practical purposes of any idea or theory or presumed fact must in the large proportion of cases be based, not on immediate personal experience, but on information or authority of others. The whole possibility of the child's profiting at all by the past experience of the race or by the larger knowledge of parent and teacher depends on belief in what he is taught. Natural selection as well as social selection would soon eliminate those members of a race who believed nothing except what they had themselves experienced. The antecedents of belief, if not the belief itself, are to be found in any social group of animals, the members of which depend upon each other for news of food or warning of danger.

The ultimate psychological law, according to the author, which explains the fact of consciousness of kind and so of all other social facts, is that "consciousness endeavors to attain painless clearness, or positive pleasure, with a minimum of difficulty." As one reflects on the work and manifold activities of the world, on the development of civilization by the long and unrelenting struggle, on the ever-widening range of interests that emerge, one is tempted to say that the formula is both too abstract and too simple to be of use for actual explanation. Consciousness cannot be adequately defined in terms either intellectual

(‘clearness’) or affective (pleasure), and the poet was a good psychologist when he wrote ‘More life and fuller,’ as the basal law of human striving.

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Talks to Teachers on Psychology, and to Students on Some of Life's Ideals. WILLIAM JAMES. New York, Henry Holt & Co. 1899. Pp. vi + 301.

This book consists of lectures on psychology given, in 1892, at the request of the Harvard Corporation, to the Cambridge teachers, and of three addresses at women's colleges. The latter are not pedagogical, but they are so congruous in subject and mode of treatment that they are properly included in the volume.

The ‘Talks to Teachers’ start from the biological conception of man as an organism adapted to react on its environment. This conception is not offered as a complete statement of the facts. The author is explicit on this point at the outset: “No one believes more strongly than I do that what our senses know as ‘this world’ is only one portion of our mind's total environment and object” (p. 25). In the last lecture Professor James's well-known position in regard to free will is stated: “a belief in free will and purely spiritual causation is still open to us. * * I myself hold with the free-willist” (p. 191). The ‘ultra-simple point of view’ is adopted for the sake of the unity and simplicity which it imparts to the exposition. It has the advantage of preserving the continuity between human and animal psychology, and of coördinating the brain life and the mental life as having one fundamental kind of purpose. Whatever higher functions and products the mind may be capable of are necessarily conditioned upon useful adaptations, so that these may be considered the more essential, or at least the more primordial.

But however proper it may be to abstract, as all sciences do, from the totality of phenomena for the purpose of clearer understanding, this procedure is attended with peculiar danger in psychology. To take the senses, a few instinctive impulses, association and the ideomotor function of will, and treat these as the whole of mind, is misleading. “I cannot but think that to apperceive your pupil as a little sensitive, impulsive, associative and reactive organism, partly fated and” (the qualification should be observed) “partly free, will lead to a better understanding of all his ways. Understand him, then, as such a subtle little piece of machinery” (p. 196). “Such is the little

interested and impulsive psychophysical organism whose springs of action the teacher must divine" (p. 62). The frequent characterization of the subject of psychology as an 'organism' and a 'machine,' the emphasis put upon reaction on the environment as the essential thing about it, the use of physiological instead of psychical terms of description—this tends to concentrate attention upon mechanical elements and aspects. The definition of education leaves out of account ideal ends—truth as intrinsically excellent, one's perfection as a rational being, etc.—and insists only on serviceable behavior. "Education cannot be better described than by calling it *the organization of acquired habits of conduct and tendencies to behavior*" (p. 29). In the enumeration of native instincts and tendencies the biological standpoint is kept in view; fear, curiosity, imitation, emulation, ambition, ownership, constructiveness, are adduced—the existence of disinterested impulses is recognized only in the bare mention of love. The expository advantages of the point of view adopted are counterbalanced by an inevitable obscuring of the free activity of mind, and by the ruling out of consideration, for the greater part, of its higher manifestations—intellectual, æsthetic and ethical. This may not be a fair criticism in view of the care taken by the author to prevent misunderstanding; but it is pertinent to ask whether partial points of view, gotten by abstracting from the complete facts, are desirable in psychology; whether, for example, it is expedient to exclude, as Professor James would do, all metaphysical prepossessions and implications. If the facts do not involve these, there can be, of course, no dispute; but those who believe that conscious experience is ontological in essence may well consider whether it is best to ignore this in the discussion of psychological problems.

These lectures illustrate the advantages of entrusting the 'popularization' of science to the hands of a master. The extravagant claims, the incautious generalizations, the profuse use of technical language, with which we are so familiar in works of a certain class, are here refreshingly absent. It is something to be thankful for that instruction and counsel so wholesome and timely as that contained in the opening remarks should gain so wide a hearing. "In my humble opinion there *is* no 'new psychology' worthy of the name. There is nothing but the old psychology which began in Locke's time, plus a little physiology of the brain and sense and theory of evolution, and a few refinements of introspective detail. * * * I say moreover that you make a great, a very great mistake if you think that psychology, being the science of the mind's laws, is something from which you can

deduce definite programmes and schemes and methods of instruction for immediate schoolroom use. Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves' (p. 7). "Least of all need you, merely *as teachers*, deem it part of your duty to become contributors to psychological science, or to make psychological observations in a methodical or responsible manner. I fear that some of the enthusiasts for child-study have thrown a certain burden upon you in this way. * * * For Heaven's sake, let the rank and file of teachers be passive readers, if they so prefer, and feel free not to contribute to the accumulation" (pp. 12, 13). If the last quoted remark should deter any too zealous investigator from entering one field, in particular, in which some truly fearful results have been achieved—that of pathological psychology—the service will be by no means small.

It is needless to say that the same qualities of thought and style which appear in the author's other works—not the least of them being a happy incapacity for dullness—are abundantly manifest in these 'talks.' One is inclined to envy Professor James the friends who tell him so many delightful anecdotes, exactly fitted to illustrate his points. A number of stories are given such as would make one's fortune at a dinner-party. If Falstaff were a sufficiently dignified personage, he might be quoted in explanation: "I am not only witty in myself, but the cause that wit is in other men." There is doubtless a delicate concession to the lady auditors in this change of gender: "Anecdotes and reminiscences will abound in all her talks, and the shuttle of interest will shoot backward and forward; another teacher has no such inventive fertility, and his lesson will always be a dead and heavy thing" (p. 96).

The lectures on habit, attention, memory, will, contain all that is most concrete and practical in the corresponding chapters of the *Principles of Psychology*. The use of needlessly mysterious and pretentious words for expressing simple meanings is effectively commented on in the lecture on apperception. The following helpful pedagogic suggestions—a few out of many—may be noted: the transitoriness of instincts (p. 61), elementary defects not fatal (p. 135), too few heads of classification (p. 163), the bulky will (p. 181), two types of inhibition (p. 193).

The 'talks to students,' which constitute the second part of the volume, have these titles: 'The Gospel of Relaxation,' 'On a Certain Blindness in Human Beings,' 'What Makes a Life Significant?' The first is an interesting and persuasive protest against mental and

moral over-tension; the other two insist on the importance of a sympathetic appreciation of the points of view and the ideals of others, showing that only thus is the common life of humanity redeemed from apparent insignificance and discerned in its potentialities of dignity and heroism. An application of the line of thought in the second and third addresses is suggested in the Preface, which may not be entirely agreeable to readers of 'imperialistic' proclivities.

This volume deserves the attention, not only of teachers, but of parents, and of all persons interested in psychology and in education.

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Conduct and the Weather—An Inductive Study of the Mental Effects of Definite Meteorological Conditions. Monograph Supplement to THE PSYCHOLOGICAL REVIEW, No. x. EDWIN GRANT DEXTER. Pp. viii+105.

This study is an attempt to throw some light upon the question of the weather in its relation to human activities. The method is for the most part inductive and consists of a comparison of the occurrence of certain data of conduct, under definite meteorological conditions, with the normal prevalence of those conditions.

The study was made for the cities of New York, and Denver, Colo.

The data considered were taken from the various public records of those cities and consist of misdemeanors in the public schools and penitentiaries, arrests for assault and battery (males and females considered separately), arrests for insanity, the death-rate, suicide, clerical errors in banks and strength-tests in the gymnasium of Columbia University. A period of more than ten years is covered and something over 400,000 data considered.

As a basis for the study, the mean temperature, barometer and humidity, the total movement of the wind, the character of the day and the precipitation, as recorded by the officers of the United States Weather Bureau, for each day of the period covered, are used. The occurrence of bad deportment in the schools and penitentiary, of assault and of the other classes of data are then referred to these meteorological conditions, and the exact weather upon which they are most prevalent determined. These relations are shown by means of tables and more than 150 curves.

Some interesting things are shown. Among them, that upon cloudy and rainy days there are less bad marks given in the schools—with the smaller attendance allowed for—less arrests for assault, and even less

suicides than upon clear, dry days. The death-rate, however, increases a little for wet weather. Upon perfectly calm days the latter is high, while all the other occurrences mentioned are below the average. Extremely high winds, too, seem to have a soothing effect, for excesses in conduct are comparatively few at such times. Moderately brisk winds have the worst effect. For high humidities, all the data, except the death-rate, were low. This seems rather strange, for muggy, sticky days are of such a character. A very marked effect is shown by the barometer. With the exception of death, all the occurrences were low for high readings, and high for the reverse condition of the mercury column. Some conclusions are drawn with respect to the relations of the barometer to periods just preceding storms. The effects of different degrees of heat are shown to be the greatest of all, temperature of from 75° to 85° being accompanied by nearly 50% more assaults and other evidences of bad conduct than the normal. Temperatures above 85° show a marked falling off, as if, under such excessive heat, little energy was left for bad behavior. A large part of the paper is devoted to the study of school children. In it are discussed the answers to a questionnaire sent out to nearly 200 teachers in various parts of the country, asking their opinions as to the effects of the weather upon their pupils. These answers are compared with the exact effects shown by the study of the records of deportment in the school registers. The teachers were almost unanimous in their opinion that the weather has its influence not only upon the deportment, but upon the character of the class work of their charges.

A study of school attendance is included in their work, and some conclusions drawn as to the influence of the weather upon the health of the pupils.

The general conclusions arrived at in the paper are that those weather states which are physically energizing and exhilarating are accompanied by an unusual number of excesses in deportment and the minimum of deaths and mental inexactnesses, while the opposite meteorological conditions show the reverse effects.

THE AUTHOR.

The Emotion of Joy. GEORGE V. N. DEARBORN. Monograph supplement to THE PSYCHOLOGICAL REVIEW, No. IX., New York, Macmillans. April, 1899. Pp. ii+70.

Starting with evolution, psychophysical parallelism, and the kinæsthetic theory of emotion as necessary and basal presuppositions, this monograph discusses the emotion of joy with somewhat of that

detail which every emotion in turn demands. On the one hand, joy is considered in its bodily aspects as dependent on universal biologic inheritance from simpler organic forms, while on the other hand its psychical characteristics are pointed out, and especially those fundamental social relations which constitute so important a part of all human emotional phenomena. The adequate study of an emotion is shown to implicate well-nigh every aspect of biology, in the narrow sense of the term. The research was introspective as well as experimental.

Three years of practical work in the psychological laboratories of Harvard and of Columbia is described in the reports of five distinct though related series of experiments. Three of these investigate and fully confirm the ancient but, for science, hitherto rather vague supposition that pleasant mental states are correlated in the body with contraction of muscles classed as extensor and unpleasant states with flexor activity, the three series of experiments relating respectively to the reactions of the hand and the head, the forearm, and the leg. The hand, because the most mobile portion of the body at our disposal, showed most emphatically the psychophysical tendency in question. The forearm was studied only as to its reaction to pleasantness and unpleasantness in voluntary extensions and flexions through an arc of about forty degrees, while in case of the hand, head and leg only the involuntary and unconscious movements were observed. The stimuli employed were odors, colored light and sound, and these were judged as pleasant, indifferent or unpleasant in seven degrees, 'one' being the most relatively pleasant and 'seven' the most unpleasant. These experiments together number about three thousand, and, considering the practical difficulties of any laboratory research into affective conditions, strongly verify the chief presupposition which from general considerations seemed *a priori* to be so probable.

The much discussed nature of the smile and laugh is hereby explained, early embryonic conditions showing that the muscles active in these phenomena are properly extensor muscles, thus at once explaining the hitherto mysterious fact of laughter and confirming the underlying theory.

The fourth set of experiments deals with the bodily correlation in general of joyous emotion in a novel and more or less productive way, while the fifth series is a research, *quantitative* as well as qualitative, into the vascular and respiratory somatic concomitants of joy.

Emotion, the most complex of human psychological phenomena, is defined as "a temporal portion of excited sentient experience

wherein the subjectivity and the psychophysical attention to the object, real or ideal, are heightened with or without a tone of pleasantness or of unpleasantness, and wherein the feeling and the bodily position or movement are, or tend to be, characteristic and correlative." Emotion properly so called may be found pure, then, only in the 'lower' or simpler orders of life, for in man the vast complexities of his, always social, personality render any such affective period beyond the physiologist's power of description. In the simpler orders of animal life, down to its vanishing-point in the *amœba*, the pleasantness-extension and unpleasantness-flexion principle is more complete; in man, however, with all the complicating and often conflicting tendencies there obtaining, its manifestations may still be regularly observed, with constant exceptions here explained, as the persistence of basal biologic law necessitates.

The regular occurrence of habitual inhibitions, due to complex conditions of civilized social development, supplies the apparent deficiency in the kinæsthetic theory of the emotions of man. Any emotion, being biologically in animals, savages and naïve infants a more or less constant series of phenomena, is theoretically at least susceptible of future scientific determination more or less exact; while the emotional processes of civilized human selves are so complicated by social interaction as to be no longer properly emotions in the biologic sense, but rather concrete expressions of the affective social consciousness at present indefinite and involved.

Analysis discriminates five components of a period of emotion—namely, psychophysical excitement; various feelings and their concomitant bodily movements and strains; heightened consciousness of the emotion's object as in relation with the subject-agent; often a pleasant or an unpleasant tone of consciousness; and at times increased self-reference.

An emotion is an affair invariably of both a mind and a body, practically the whole of the latter of which it regularly implicates: it is universally dynamogenic.

Contraction of the extensor muscles is more pleasant in itself than contraction of the flexors, and this fact, together with the general tendency to flexion which a (naturally unpleasant) sudden shock produces, perhaps determined, phylogenetically, the empirical opposed mode of affective bodily function.

A bibliography of about one hundred and twenty-five volumes bearing on the subject and its relations may be found at the conclusion of the monograph.

THE AUTHOR.

OPTICAL ILLUSIONS.

Raumästhetik und geometrisch-optische Täuschungen. THEODOR

LIPPS. Zeitsch. f. Psych. u. Phys., XVIII., p. 405.

Ueber die Natur der geometrisch-optischen Täuschungen. ST.

WITASEK. Zeitsch. f. Psych. u. Phys., XIX., p. 81.

Eine einfache physiologische Erklärung für verschiedene geometrisch-optische Täuschungen. E. EINTHOVEN. Pflüger's Archiv,

LXXI., p. 1.

Ueber geometrisch-optische Täuschung. W. VON ZEHENDER.

Zeitsch. f. Psych. und Phys., XX., p. 65.

The article by Lipps is written in reply to the criticisms made by Heymans in his review of Lipps' book on optical illusions. The special discussions of the particular figures may be omitted in this brief review. They are in part new, in part repetitions of the earlier applications of the principles of weight, bounding activity and the other æsthetical factors of which Lipps has made use in all his writings.

On the more general question of the nature of illusions, Lipps again defends at length the position that illusions are false judgments, not false percepts. They arise through comparison, and it is during the act of comparison that the idea based on the percept—not the percept itself—is so modified by the addition of the æsthetical ideas that it is changed from its original form to the illusory form.

The article of Witasek takes up the problem with which Lipps deals, and attempts to show on theoretical and on empirical grounds, that the illusion in the Zöllner figure, and presumably those in the other figures, cannot be due to false judgments, but must be, in some way, due to modifications in sensation processes.

The paper opens with a comprehensive review of the recent work on geometrical illusions and an attempt to arrange all the various theories in an appropriate scheme of classification. All processes containing illusions are complete only when they close with a judgment. The judgment is based, however, on percepts, and any illusion may be due either to the percepts on which the judgment is based, or to the method of dealing subjectively with the percept during the act of judging. According as the one phase or the other of the complete process is selected as responsible for the illusion the theories may be classed as judgment-theories or perception-theories. But perception is the result of combining sensations. It is possible, therefore, to subdivide perception-theories into these which attribute the illusion to the

sensation factors and those which attribute the illusion to the synthetic process. The nature of the synthetic process is, however, always predetermined by the sensation factors entering into the percept, and so the sub-class which attributes the illusion to the synthetic processes is of small importance.

As between judgment-theories and perception-theories, the writer decides on the following theoretical grounds in favor of the latter. Judgments may be acts of comparison or acts of classification. But a judgment which discovers a difference between two percepts must have found the difference in some actual disagreement present in the percepts themselves, otherwise no ground for judging a difference would be present. An illusion always involves such a judgment of difference; we must then, according to the above, look for the ground of this judged difference in the percept rather than in the process of judgment. In the second place, a false classification cannot be regarded as the explanation of illusions, for it is not a question here of right naming or right grouping under remembered categories: but rather it is a question of the continuity of a perceived category (as, for example, whether a line is continuously straight or not), or it is a question of the correspondence between two cases of the same general category.

The empirical evidence with which the writer confirms his theoretical discussions is derived from two groups of experiments on the Zöllner figure. In the first group the parallels and the transverse obliques were drawn on two separate cards and united binocularly into a single figure. At the beginning of experimentation the observer was disturbed by binocular rivalry, but after practice the writer tells us that he was able to overcome this enough to observe the figures for considerable intervals without rivalry. The illusion was at first lost entirely, but as rivalry was gradually overcome it reappeared and steadily increased in intensity. At last, when rivalry disappeared entirely, the illusion was clearly noticeable but somewhat less intense than when the two parts of the figure are observed in the ordinary way. This decrease in intensity was subjected to quantitative determinations, and proved to be on a general average about 75 per cent. The writer argues: the Zöllner figure percept formed by binocular fusion in the manner described is just the same for judgment as one formed in the ordinary way. The decrease in intensity of the illusion which was discovered was, therefore, not explicable on any judgment-theory. The decrease must be attributed to the change in the conditions of perception. Similar results leading to the same conclusion were secured on

other figures, though there is no detailed report of the other experiments.

The second group of experiments deals with the presence of unnoticed illusory influences. When a single line is crossed by transverse obliques the illusory effect may be present, though it is too small to be easily judged. The method of the experiment was as follows: a mercury mirror was so arranged that cards could be placed on edge on the horizontal surface of the mirror. The cards were thus held perpendicular to the mirror. Along the horizontal edge of the cards, just at the surface of the mirror, were drawn horizontal lines. From these horizontals were drawn perpendicular verticals. The verticals were so reflected in the mirror that they and their reflections seemed to form continuous straight lines. When the perpendiculars were inclined toward the horizontals, or when they seemed so inclined, the line and its reflection no longer seemed continuous, but seemed to form an obtuse angle at the surface of the mirror. There are two ways, then, of judging whether the angles between the horizontal and verticals are right angles: one is by inspection of the angle itself, the other is by judgment of the straightness of the line formed by the real line and its reflection. If transverse obliques, such as those used in the Zöllner figures, are drawn across the vertical, it will be found that at certain angles of obliquity a really vertical line will be so slightly affected by the transverse lines that inspection of the angle does not reveal any noticeable diminution of the right angle, while observation of the mirror line will show that the apparent continuity of vertical and reflection is destroyed. The writer argues that the illusory effect must have been present in the inspected right angle, but it was too slight to be noticed under those relatively unfavorable conditions of judgment. There may, therefore, be a perceptual illusion even when there is no illusion of judgment.

The binocular experiments are quite as difficult to criticise as they were to perform. The fact that rivalry was overcome by practice is a result of importance in itself, and certainly calls for some further investigation. Other investigators have been unable to overcome rivalry by practice. The character of the result obtained under such conditions will always be questionable. And it certainly does not follow, as against Lipps, for example, that such binocular images are equal in value to the ordinary Zöllner figures. The attention must be seriously distracted by the strain of overcoming rivalry, and the æsthetical effect will naturally be reduced proportionately. Or, in terms of Filehne's hypothesis, one might say that the conditions here presented are fur-

ther removed than ever from ordinary perspective drawings, and the effect of tridimensional associations is accordingly much weakened.

The mirror experiments are ingenious in method and tend to establish a fact of importance. That the reflected image does not enter as a disturbing factor is not clearly made out by the writer.

The main thesis of the paper, as opposed to Lipps' contention that illusions are due to judgment, opens up an issue on which it seems impossible to reach any generally acceptable opinion. Conscious and unconscious judgments, associations of all degrees, synthetic perceptual processes, all pass so easily into each other that it is impossible to draw a hard and fast line and say the illusion is here or there. If a group of sensation factors is such as to invite the addition of this or that association factor, and if after the association factor has been added, the subject finds his judgment biased, then there is undoubtedly a sense in which the illusion belongs in every stage of the process. Until agreement can be reached on the more fundamental psychological questions of the relations of sensations to percepts and of percepts to judgments, there will always be disagreements in this special field. The more concrete question of what the association factor is—putting aside now the question of where it is added—is an exceedingly complex one. Recent discussions have all tended to the general impression that such factors may be of great variety even in a single illusion. The writers who depend on movement, those depending on æsthetical motives, those who call in perspective, and finally those who give less generally applicable explanations of particular illusions, are not necessarily in opposition to each other, though the criticisms with which these writers usually introduce their work indicate a general lack of agreement.

Finally, as to the source or motive of the association or other cause of the illusion, every new writer points out some new possibility. It is at this point that we may introduce the last two articles of our list. The paper by Einthoven offers in explanation of illusions of the Müller-Lyer and Poggendorff types, a theory which is allied to the irradiation explanation of the latter figure given by Helmholtz (p. 708, 4th edit.). Einthoven's hypothesis is as follows: Most of the points of a figure cast their images on the periphery rather than on the center of the retina. These peripheral images are made up of diffusion circles, and in judging of lengths and directions the observer is guided by the greatest amount of overlapping of the diffusion circles. Thus in the Poggendorff figure the diffusion circles lead the observer to locate the point of contact of the intercepting parallels and the intercepted oblique within the acute angle.

The explanation does not aim to apply to all illusions, but only to the types mentioned. The freedom with which it deals with indirect vision, which is at best an obscure factor, and the apparently direct vision involved in all illusions, furnish the criticisms of this theory. Figures seen in indirect vision, when attended to at all, are usually interpreted in terms of what is seen when the image falls on the fovea, not *vice versa*.

The fourth paper is a deplorable example of misdirected effort. It illustrates in a very striking way the danger of making hypotheses on the basis of some one's else results. How it could ever have escaped the attention of author and editors that the facts are exactly reversed is hard to understand. Such, however, is the case, as will be seen from the following: The main thesis of the paper is, that the Poggendorff illusion can be explained by certain facts long ago discovered by Volkmann. Volkmann took two lines: one fixed, the other capable of rotation around its center. He allowed the observer to set them so that they seemed parallel. The result was (and it is quoted in italics by von Zehender) that "*Die Diameter [that is, the lines referred to] welche parallel erscheinen divergiren ohne Ausnahme nach oben.*"¹ That is, lines which seem parallel do in reality diverge at the top. Lines which are in reality parallel will therefore seem to converge. In spite of this well-known fact, von Zehender lays at the foundation of his hypothesis the following statement, in accordance with which all his figures are drawn, and on the validity of which the value of his theory of course depends: "*Die beiden Linien A und B in vorstehender Figur 2 seien die wirklichen Parallellinien, durch deren Zwischenraum die Continuität des Schrägstriches ($\alpha^\circ\beta^\circ$) unterbrochen wird. Nach den Ergebnissen der Volkmann'schen Versuche erscheinen diese beiden Parallellinien nach oben schwach divergent.*"² The explanation which follows is based on this statement and requires no comments.

In the second part of the paper the writer attacks a somewhat different problem on the basis of certain facts first reported by Oppel. The problem is the estimation of the sizes of acute angles. If a vertical and a horizontal line are so drawn that they intersect at right angles in the middle of a visual field, thus dividing the field into rectangular quadrants, and if then the subject is asked to bisect the four right angles thus formed, it will be found that the lines of bisection will always be placed too near the horizontal lines. That is, an angle which has one horizontal edge and is in reality small, will seem equal

¹ P. 70.

² P. 71.

to an angle with one edge vertical which is in reality larger. The small angle is evidently taken for larger than it really is, while the larger angle is correspondingly underestimated. Here is von Zehender's statement: " * * * dass (Spitze) Winkel, die sich mit einem ihrer Schenkel der verticalen Richtung anschliessen, irrthümlich leicht für grösser gehalten werden als sie sind, während ebensolche Winkel, die sich mit einem ihrer Schenkel der horizontalen Richtung anschliessen, ebenso leicht für kleiner gehalten werden als sie in Wirklichkeit sind."¹

If the conclusion were to be seriously considered in spite of its wrong statement, it might be objected that two acute angles which are parts of a right angle are hardly suitable examples on which to test the attributes of acute angles in general. But the further consideration of the paper may be omitted.

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Psychology and the Individual Teacher. CHARLES H. JUDD.
Journal of Pedagogy, XII., 136-148. 1899.

The present article is a defence of the value of the study of experimental psychology to the teacher. The general standpoint is found in the relation of the teacher to the child.

Education is analyzed to be in its broadest sense the 'acquiring, arranging and applying experiences.' For such activities the teacher is not necessary. The child by itself will learn something, however little, and instruction becomes necessary only that the individual may economize time and energy in the acquirement of experience. The teacher has, accordingly, a twofold function in dealing 'with the content of human experience' and 'with the child who is to be put into possession of this content.' Material and method are alike indispensable to the teacher. With the first psychology claims to have nothing to do, and it is only from the point of view of method that the science can pretend to be of advantage to the teacher. The author assigns to the teacher the function of training the child to look at various experiences in the same manner as does the adult, and he shows that it is the plan and the duty of psychology to indicate how the higher level may be best and most easily reached. Experimental psychology shows the teacher how to analyze material for the better presentation to the growing mind, and it makes him familiar 'by analogy with the relation of children's mental lives and their external

¹P. 99.

conditions.' *Rules* for the teacher to obey should not be given by psychology, but *principles* should be established, which may be applied under varying conditions. This last factor, variation, brings out most clearly the value to the individual teacher of the study of psychology. If principles are understood, and some facts underlying the principles are known, new facts will be assimilated and arranged with the old, and methods will be changed accordingly. With fixed rules, however, new conditions find the teacher unprepared by training, and method becomes forced and stilted.

Finally, what the teachers need "is a broad, general course in psychology to bring them back into a vital sympathetic relation with the practical investigation of the child's mental condition. Such training places the individual teacher above the theory."

SHEPHERD IVORY FRANZ.

University of Iowa Studies in Psychology. Edited by G. T. W. PATRICK. Vol. II., pp. 163. 1899. Iowa City, Ia. \$1.00.

The present volume includes (1) short studies by Professor Seashore on the Müller-Lyer illusion, a material-weight illusion, localization of sound, acuteness of hearing, pitch discrimination and motor ability; (2) an account of experiments upon the analysis of the perceptions of taste; (3) a discussion of some phenomena of the secondary personality, and (4) the description of two new pieces of apparatus.

1. The first series 'have been selected,' we are told, 'with reference to the need of data, their interrelations, and the adaptation of methods and apparatus.' Some of the experiments are standard ones, 'some have been developed by other investigators and are here developed a step farther, and some are new.'

(a) Various forms of the Müller-Lyer illusion were used to note the effect of the illusion under varying circumstances. The limiting lines were circles, coins, squares and angles. It was found that the force of the illusion decreased with the size of the coin, and when, instead of coins, circles were used the illusion was lessened. Complexity of outline increases the force of the illusion, and "it also appears that the fainter the outline is the more the eye strives to follow it." The introduction of a base line lessened the illusion, and the limiting lines greatly affect the amount of the illusion—circles, 13 %; squares, 1 %. "A vertical distance is overestimated when compared with a horizontal distance." Practice has no effect in increasing or diminishing the illusion if the subject remains in ignorance of its presence,

but there is a decrease in variability. Women are more susceptible to the illusion and are more variable than men. Two hundred children that were tested showed double the effect noted on adults, but no difference was noted for the two sexes. There seemed to be no regular decrease with growth and no general relation with mental ability was found.

(*b*) The material-weight illusion. Each of three cylindrical blocks of wood, iron and cork, of the same size and of uniform weight, was compared with standard sets of blocks and the estimation of weight was noted. Eight determinations were made by each subject with each block. In general the cork and the wood blocks were overestimated and the iron block underestimated. The illusion is about 18 % of the actual weight, and is about the same for women as for men. The essential condition of the illusion is that the preliminary estimation of the weight of the different blocks shall be wrong—*i. e.*, the subject has the autosuggestion that the cork and the wood blocks are light and the iron one heavy; but when lifted the cork and the wood blocks are felt heavier than was supposed, while the iron block is much lighter than was judged. The illusion persisted even when its nature was known, but not so strongly. There seems to be no variation with age or sex.

An interesting suggestion is made that it may be possible to increase the muscular ability by means of the illusion. If the subject *thinks* he is lifting less than what he is actually lifting, would he be as greatly fatigued after lifting this weight one hundred times as he would be if it felt heavier? And, in like manner, may not the maximum effort be increased by means of this illusion? A few experiments show that the maximum effort was affected by the size-weight illusion. "Nearly all who have tried it can lift more in the barrel (a flour-barrel) than in the half-peck measure."

(*c*) Localization of sound in the median plane. A 100 v.d. tuning-fork connected with an induction coil gave sounds in three different places relative to the observer—above, right and left. Strong and weak sounds were given, and sometimes two sounds together. Estimations were made of the distance in feet, and the direction in degrees in the vertical and horizontal planes. There was a tendency to locate the sound produced overhead as 'upward and forward.' Of the fused sounds (right and left together), 25% were thought to be in front of the vertical plane, 73% back of it and 3% in it. 72% of the sounds were located above the horizontal plane, 12% below and 16% in it. The grouping of the subjects into three classes according to the

differences in acuteness of hearing between the two ears showed a marked tendency to locate a median sound toward the side of the stronger ear. When the sounds were in the median plane and their probable location unknown, there was found little ability to locate them properly. The ability was not improved when the probable location was known.

(d) Hearing-ability and discriminative sensibility for pitch. In these tests great individual differences were noted. The average hearing ability of the men and women was found to be about equal. The women, however, had much better discriminative ability for pitch. No marked relation between keenness of hearing and accuracy of pitch discrimination was noted. The keenness of hearing of children seems to increase with age, and likewise the pitch discrimination. Some of the differences, however, may be due to lack of understanding on the part of the younger scholars, not to mention the error of drawing conclusions from such a small number of children that were tested. No relation was found to exist between pitch discrimination and mental ability, the distribution of cases seeming to be a chance arrangement. It is concluded that "this is the strongest evidence in favor of the theory that the discriminative sensibility for pitch depends principally upon the natural structure of the end-organ and is subject only to small variation with education." It seems to the reviewer that a more extended series of observations must be made, and the results confirmed ere this conclusion can be safely accepted.

(e) Motor ability, reaction time, rhythm and time sense. Fifty-six subjects were tested, and no differences were found between men and women either in rapidity of movement or in the variation. Reaction to sound gave the shortest and least variable times, reactions to touch were next in length and reactions to light took the longest time. Discrimination time—*i. e.*, the whole time less the simple reaction time—was found to be about 75σ and the choice time about 90σ . The variation in each of these series was about equal. A free rhythm was kept quite constant for 90 seconds by all observers. The pressure with which the rhythm was made constantly increased. The rhythm established seemed to be somewhat determined by the respiratory and circulatory processes. In a regulated rhythm, the subject making taps in conjunction with a mechanical stimulus, there was found a marked tendency to accelerate the movement, and the men seemed to be slightly more accurate than the women. Estimations of empty time intervals of $\frac{1}{4}$, $\frac{1}{2}$, 1, 2, 5, 10, 20 and 40 seconds by the method of average error showed an overestimation for the shorter intervals and

(with two exceptions) an average underestimation for the longer times. School children made almost correct estimations of 5 seconds, but underestimations of the 10- and 20-second intervals. No sexual differences were noted in this test.

2. In this article Professor Patrick gives an interesting and valuable account of taste experiments with an anosmic subject. Popularly the taste of any substance is thought to be conditioned largely by taste sensations. It is known, however, that smell, touch and sight play large parts in our taste perceptions. The analyses of the influence of each of these factors have been few and incomplete, and the present study will be gladly welcomed. The several theories regarding the qualities of tastes are noted. The theory that there are four primary tastes, which by combinations and fusions produce an indefinite number of other tastes, was tested with the anosmic and three normal women as observers. Mixtures of salt, sweet, bitter (quinine) and sour (tartaric acid) solutions were used to discover whether such mixtures gave new qualitative tastes or permitted the simple constituent tastes to be perceived. The latter condition was found to be true. All the observers were able to analyze the mixtures with a considerable degree of accuracy. After considering other investigations the author concludes "that the hypothesis which seems at present most in accord with known facts is that there are only four taste sensations (possibly only two); that these remain distinct in consciousness, not subject to fusion or mixture with each other, and that the manifold taste perceptions of daily experience are made up of these four taste sensations, with their grades of intensity, and sensations of smell, touch, temperature, sight, and muscle sensations." Of touch and smell, the more important is probably touch, while sight plays a more important part than has commonly been supposed. In any analysis of tastes various difficulties confront the investigator and the only factor easily eliminated is sight. With normal subjects smell cannot be entirely eliminated even by closing the nostrils, while it is almost impossible to exclude touch sensations. In complete anosmia results may be obtained which are uninfluenced by smell sensations, since these are wholly wanting. The observer used was a woman peculiarly suited by education for such experiments. Blindfolded she was unable to get any reaction or sensation from over twenty-five substances which ranged through the nine classes of smells enumerated by Zwaardemaker. Those substances which could be determined were found to give taste sensations in the back of the throat or to produce touch sensations in the mucous membranes. The observer's taste sensations were then tested with

numerous familiar chemical and household substances, and the results were compared with those from several normal persons. The anosmic was found to be less active in judgment of salt, quinine and acid solutions. She had finer discrimination for passive touch. It was found that the substances that could not be recognized by any of the subjects depended entirely upon visual sensations for their supposed qualities, those recognized by the normal observers evidently depended upon the smell qualities, those recognized by all depended upon taste, touch and muscular sensations, while those recognized only by the anosmic depended upon differences in texture (*i. e.*, in touch sensations). "On the whole the experiments confirm the hypothesis made in this article, and while not diminishing the importance which has been given to sensations of smell in the 'tastes' of common experience, they indicate that touch and muscle sensations play an unexpectedly important part." The article brings out clearly some of the unsolved problems of the relations of the less intellectual senses and it will undoubtedly draw the attention of many to this almost virgin field.

3. Professor Patrick's second article is already known to readers of the REVIEW, from which it is reprinted (Vol. V., No. 6). It needs no further mention.

4. Two new pieces of apparatus are described by Dr. Seashore. The spark chronoscope is a pendulum chronoscope with arrangements for taking records by the graphic method while the pendulum is in motion. The following excellences are claimed for the new instrument: "Accuracy, adaptation for a variety of connections, soundless action, direct reading, ease and permanence of adjustment, and quickness and convenience of manipulation."

The audiometer is an instrument to produce variations in sounds and to measure the keenness of hearing. The new feature of the instrument is the use of varying sized secondary coils of an induction apparatus for sending currents to telephone receivers. The larger the secondary coil—*i. e.*, the greater the number of wire turns—the more intense will be the sound produced. The intensities vary from 1 to 1079. Simplicity, convenience, accuracy, constancy and size are noted as some of the merits of the apparatus.

The whole volume is interesting and instructive. The sole criticism the reviewer would make is that the first series of articles are 'minor studies.' None of the problems are treated exhaustively and, as Dr. Seashore rightly suggests, "all the time and energy might well have been devoted to one of the problems or a part of one." It is hoped that the researches here begun will be completed in future issues of the Studies.

SHEPHERD IVORY FRANZ.

Magic, Stage Illusions and Scientific Diversions, including Trick Photography. Compiled and edited by ALBERT F. HOPKINS, with an Introduction by HENRY RIDGELY EVANS. New York, Munn & Co., 1897. Pp. xii + 556, 400 illustrations.

Spirit Slate Writing and kindred Phenomena. WILLIAM E. ROBINSON. New York, Munn & Co., 1898. Pp. v + 146, 66 illustrations.

The contents of the work on 'Magic' are indicated by the five books into which it is divided, which are as follows: (1) Conjurers' tricks and stage illusions; (2) Ancient magic; (3) Science and the theater; (4) Automatic and curious toys, and (5) Photographic diversions. There is also a useful bibliography. 'Slate Writing' describes most of the phenomena of the ordinary spiritualistic séance.

The books are primarily intended for the general public and are well suited for instruction and amusement. The boy who learns these tricks at fourteen has a pleasant and useful employment, and is less likely to be a spiritualist or Christian scientist, and more likely to be a serious student of physics and psychology ten years later.

But the books also deserve notice in a psychological journal and a place in the psychological library. Conjurers' tricks and illusions offer a rich and almost unworked mine for the study of the psychology of perception. Suggestibility and the psychology of the crowd are important factors in the success of such exhibitions, and from this point of view they offer opportunity for research. The books should certainly be read by those interested in 'psychical research.' The numerous and varied methods by which ghosts can be made to appear and slate writing can be produced should lead every one to doubt his senses and his ingenuity on the occasion of their production. Lastly, many of the devices used for the production of illusions, etc., are extremely ingenious, and could to advantage be copied in the laboratory. The methods of chrono-photography, though scarcely deserving to be classed under 'magic,' are of special interest, as these should be used by the psychologist for the study of both perception and movement.

J. McK. C.

Kant und Helmholtz: Populärwissenschaftliche Studie. LUDWIG GOLDSCHMIDT. Leipzig, Leopold Voss. 1898. Pp. 135.

It is only in Germany that such a work as this could possibly be considered popular. Indeed, even in that country its popular character

must consist chiefly in the usual quotations from the 'Dichterphilosoph' Goethe, for not only is the thought difficult, but the style, at least in parts, is excessively stilted and artificial.

The author is evidently, above all, a mathematician, and the work throughout is written from a mathematical standpoint. It is divided into three parts. The first describes some of the more general relations between the two thinkers; the second is devoted to an exposition of Kant, particularly of doctrines relating to mathematics; the third, which is the largest and by all means the most significant, deals with the conflict between the doctrines of space represented by each investigator. This chapter contains an interesting discussion of the modern non-Euclidian geometry. Toward the end the author becomes critic as well as expositor and endeavors to defend the Kantian doctrine of the *a priori* character of space against the attacks of Helmholtz.

The chief value of the works consists in the exposition. Its difficulty lies in its manner, for the style is not clear and the author has made the mistake, unusual in a German work, of failing to subdivide his material. The latter fault is particularly trying, especially in a book in which constant re-orientation is an absolute necessity. The author is very evidently a master in his field.

F. KENNEDY.

UNIVERSITY OF COLORADO.

A Basis for Theory of Color-Vision. WILLIAM PATTEN, PH.D.
American Naturalist, Vol. XXXII., No. 383, Nov., 1898. Pp. 832-857.

Professor Patten, of Dartmouth, in this paper, prepared for the Morphological Society meeting of December, 1896, takes a step in the direction which is apt to lead to a theory of color-vision more satisfactory than those, based chiefly on the phenomena of the process, which we now have. From histological research made more than a dozen years ago (see 'Mitt. aus Neapel,' 1896) and since, he has reason to believe that the eye in its essential structure and action is somewhat similar to the ear. He investigated the visual organs of the lower orders, chiefly the mollusca and arthropods, and as a result maintains that "the rods and cones, or the parts corresponding to them in the lower animals, are not homogeneous, but fibrillated, and that in a number of invertebrates the fibrils are arranged according to their length in accurately graded series, and in such a position that they always stand at right angles to the rays of light that fall on them. The ether waves thus vibrate across a series of fibrils of different

lengths." The structural unit of the eye, then, appears to be a fibril from one to four micro-millimeters in length, many hundreds of which may be present in each rod or ganglion-cell. It seems highly probable to Dr. Patten that this structure is that also of all eyes, however difficult it may be to prove the fact in the higher animals and man.

This structural hypothesis is applied interestingly to the various conditions of vision, chromatic and achromatic, and it appears to suit very well. Ten illustrations are scattered about the text.

It is interesting to note that the main thesis of this paper have been recently corroborated in general terms by the elaborate researches of Professor Apáthy into the fibrillation of the neurons as well as by the work of several histologists upon the finer structure of the sensory end-organs and of the neural fabric in general. The probability that the retinal elements are fibrillated in a manner proportional to the empirical complexity of their function is rendered highly presumable by this extended work here rather too briefly reported.

GEORGE V. DEARBORN.

COLUMBIA UNIVERSITY.

The Ethical System of Adam Smith. ETHEL MUIR. Cornell University. 1898. Pp. 67.

After a brief statement of the antecedent 'moral sense' philosophers, the writer considers the ethical system of Adam Smith in two chapters; Sympathy; The Nature of Conscience. In the Conclusion this division is adhered to and reinforced by a discussion of 'the function of reason and sense in *The Theory of Moral Sentiments*.'

With Adam Smith, approval and sympathy are coextensive. He endeavors to meet Hutcheson's objection that we sometimes do approve without sympathizing, by positing a 'conditional sympathy.' That is, in all cases where we approve without sympathizing, we know we should sympathize if we attended sufficiently to the impression. The approval is grounded in this 'conditional sympathy.' Dr. Muir accepts this view and goes so far as to say that it is not the exception (as Adam Smith considered it) but the rule: we approve not upon sympathy, but upon 'conditional sympathy.' If the characteristic quality of sympathy be considered, the recognition of myself in another, then in the ensuing sense of ownership in that other, I cannot avoid a certain emotional warmth. Why this emotional quality accompanying the sense of ownership, should be called sympathy only when it has risen to a certain degree it is difficult to see. It appears that this distinction between sympathy and 'conditional sym-

pathy' is a remnant of the ancient logical method in psychological procedure, and is in the nature of things uncalled for. On the other hand, if we invariably sympathize when we approve, it cannot be said that we necessarily approve when we sympathize. Often the sympathetic expression is so shot through with feelings of attachment, tenderness, etc., that the individual never attains to the ethical moment, when he either approves or disapproves. His sympathy is the spontaneous expression of a primitive form of himself. Sympathy that is also approval, has freed itself from these trammels and stands as a moral attitude. It is the expression of the ethical self.

Dr. Muir considers the relation of Reason to Sympathy, the great problem of *The Theory*; and believes the great underlying principle of the system is reason. Unfortunately we are not told whether 'the judging faculty' or 'the higher reason' is intended. Here is indeed a great obstacle to a purely expository and critical study of any but the most modern moralists. Even up to Adam Smith's time, psychology had not yet ripened into a propædæutic to ethics; and terms were largely used either in the loose popular sense or left altogether undefined. In the relation of Reason to Sense, the writer sharpens the position of Adam Smith by opposing it to that of Kant. "Smith regards reason as supreme, and sympathy as occupying a subordinate position (p. 64) * * *. But reason is dependent upon sympathy for assistance in the formation of its judgments and its rules. For, without sympathy man would be unable to enter into any relations where morality would be possible or where there could be any necessity for the moral judgments of reason" (p. 67). Adam Smith is said by Dr. Muir to identify conscience with reason; again, "The supreme judge of conduct is the self" (p. 56). It would probably be a correct reading of Adam Smith's theory to say that to him the highest good is self-approbation. This the writer implies, but nowhere very clearly expresses.

J. W. L. JONES.

PRINCETON UNIVERSITY.

The Applicability of Weber's Law to Smell. ELEANOR ACHESON McCULLOCH GAMBLE. *American Journal of Psychology*, X., 1-62.

Miss Gamble's main problem is indicated by the title of her dissertation, and the evidence she offers is the result of her own painstaking experiments in this difficult and somewhat unattractive field. Zwaardemaker's olfactometer was employed (in which, as is well-

known, the intensity of the odor is regulated by slipping out beyond the end of a glass inhaling-tube more or less of a surrounding cylinder containing the redolent material), and there were used some twenty-six odorous substances both liquid and solid, gathered from the four quarters of the globe. In the main, the procedure was to give an inhalation of the standard intensity, then a stimulation clearly stronger or weaker, whereupon the subject moved the sliding cylinder until the sensation was just noticeably different from the standard. If the experiments were from the first designed to test Weber's law, it is surprising that, of so many performed, so few were carried out without changing either the subject or the substance or the nostril or the method. The net number of experiments in which all these conditions remained constant, with a change of the standard intensity alone, is very small; and even among these no system is apparent in the variations of the standard.

Out of it all, however, there is the indication that for two standard intensities, the difference-threshold often makes some approach to what Weber's law would require, although striking departures are likewise apparent. For the two standards the threshold was, on an average, something over one-third for the lower, and over one-fourth for the higher. In other words, the value came closer to a *relative* constancy of the threshold than to an absolute constancy, and consequently (the author argues) it may be said to be evidence in favor of the law. This would of course be better reasoning if we were sure that the threshold must show either one or the other form of constancy, and that by excluding the one alternative we could force on the other: but whether these alternatives exhaust the field is one of the matters to be proved.

As regards the value of the difference-threshold for the different odors, regardless of intensity, it was found to lie in the neighborhood of one-third in a large proportion of cases, and to be fairly constant for the different odors (as against Zwaardemaker), except for some few substances when the apparatus is supposed to have been at fault.

The author is aware that the adjusting of the tube by the subject was a possible source of error, in that the judgment may have been influenced by the feeling of the distance the hand was moving, as well as by the mere variation of the odor. In fact the error from this source she believes to have been one of the main causes for the falling off of the threshold for the higher intensities. It seems to me that this might also account for some of the constancy found for the different substances. Certainly in view of so grave a source of error the reasons offered for not having the experimenter make the changes—that

it would have excluded some of the substances used, or would have made the procedure more laborious—seem quite inadequate. Fewer experiments concentrated on definitely arranged standard intensities, with fewer subjects and fewer substances, could well have given clearer results as far as the main problem was concerned.

The good historical introduction and the, at times perhaps, too minute account of the preparation of materials, with all the difficulties involved, should be read by any one who proposes work in this line.

G. M. STRATTON.

UNIVERSITY OF CALIFORNIA.

Psychology for Teachers. By C. LLOYD MORGAN. New York, Charles Scribner's Sons. Pp. xi + 240.

In writing this book the author evidently intended, not so much to present a system of psychology, as to point out the more important traits the teacher must take account of to produce a rounded mental result. It is, of course, a nice matter in such a case to determine just how much psychology, and of what sort, can best be employed; and some will undoubtedly feel that Mr. Morgan might well have apportioned his space in a different way. In fact, with the exception of the last two chapters, of which more will be said later, the best things in the book are not given the systematic chapter discussions, but are tucked away in scattered paragraphs.

The author's psychology has the strong points of the great English tradition—an emphasis on association and language and personal experience and the constant testing of conceptions thereby; and yet with no slighting of the motor and emotional and volitional functions of mind. But teachers will look in vain for their old friend 'apperception,' nor will they find a single reference to a nerve-cell or a 'higher-center.' The book may thus seem a trifle tame to those who take their summer recreation at the psychological laboratory and are at home in child study and the central nervous system. And yet, even though the author treats all these things as if they were not, he has written in a most helpful way because of his grasp of the real purpose of education and of the deeper structure of the mind.

Like many a good story, however, the book does not carry one along at first. The somewhat labored distinctions between sensation and 'sencept'—an unpardonable word—percept and concept, perception and conception, fail to arouse much interest, and may discourage many a conscientious reader who feels that he can not go on unless he masters these. Less abstractions here, and more reliance on illustra-

tions drawn from the field of illusion, which the author neglects entirely, would perhaps have served the purpose better. Association, although given an entire chapter, is kept well within bounds, and not made an all-explaining principle; so that he can perhaps the more readily believe not only in the uses of interest but also in those of drudgery and of sheer resolve. Expression is only touched on here and there, and then with more regard for its social value than for its reactive and clarifying effect upon the mind. It is a great means of self-mastery and in teachers' psychology should have a prominent place. The intellectual as well as the moral use of skill in hand-work and games, which, of course, is one phase of expression, is, however, briefly but forcibly stated by the author. If mention were to be made of scant justice done to other subjects pedagogically important, there is certainly not given to imitation and suggestion generally the treatment that the present interest might be expected to invite.

The different threads of the mental life are kept well together. One does not have that constant view of various strands at once, which a writer like Höffding gives; but for the teachers' purpose the same end is approached by some good images—the spirited horses and coach and driver (the provisional figure for the different sides of mind) having finally to be consolidated into a centaur to express the true relation, and again where he says that “the cognitive aspect of experience * * * gives the form and grouping of the picture of consciousness; the emotional aspect * * * gives the color and tone of the picture.” But best of all is his happy insistence on the ‘margin’ and ‘background’ of consciousness, with their vital relation to all that comes within the focus of attention. The art of teaching is not merely to provide for a suitable play and clearness of this intellectual fixation-point, but to get the right things ‘inextricably woven into the mental background,’ and to lay up there stores of ‘strength and wisdom and emotional prejudices of a goodly human kind.’ What a benefit if this mere phrase from the book—‘emotional prejudices of a goodly human kind’ (quoted by the author from Miss Simcox)—could itself become inextricably interwoven into every teacher’s mental background! But the book is temperate throughout, and there is no overrating of feeling or of will at the expense of the more purely intellectual processes, as if the child could be stanch and steady irrespective of his intellectual insights.

Education, on the contrary, is seen by the author to be a many-sided affair, and no cheap and ready formula is offered for its attainment. It is not to be reached without doing justice to the intellectual

and emotional and volitional sides of life, and so directing these that the child is put in *rapport* with the great spiritual possessions and ideals of mankind. He must be brought face-to-face with facts and thus make his conceptions tally with them, but he must develop his powers of appreciation and of sociability. The closing chapters on 'literature' and on 'character and conduct' ought to be read, even if all the rest be skipped. The teacher is shown that in some way the inner warmth of art and especially of literature must be imparted; and, in so doing, *knowledge* of the work—its intellectual aspect—must not be confused with the peculiar æsthetic enjoyment. Education also means the growth of character—the adoption of the social aim, not in a spirit that is sentimental and visionary, but with an active interest in small and unimposing social gains wherever possible. It means finally the cultivation of the *religious attitude*, as distinguished from special forms of belief. The author is fully aware that these are the most delicate and searching parts of the teacher's work, and are to be accomplished less by direct instruction than by a fine spiritual contagion. The teacher's own sympathies and appreciations here, rather than his precepts, are what count.

G. M. STRATTON.

UNIVERSITY OF CALIFORNIA.

Ein einfacher Apparat zur Bestimmung der Empfindlichkeit von Temperaturpunkten. F. KIESOW. Philos. Stud., XIV., 4, 589-590.

Dr. Kiesow here describes an apparatus for finding heat and cold spots. Heretofore a difficulty has been experienced in having to use instruments that would not keep an even temperature or whose temperature could not readily be altered. The present instrument seems to have overcome the latter difficulty but not the former.

The apparatus consists of a hollow cone in which are two pipes with leads from bottles containing hot and cold water respectively. The temperature is regulated by raising or lowering one of the bottles, so that the hot or cold (as the case may be) water flows towards the other. This permits a ready change in the temperature of the instrument, but the arrangement for constancy is awkward. The constant cooling of the instrument necessitates a continual shifting of the bottles to keep the liquid always of the same temperature.

An electric apparatus, though more expensive, might be devised to overcome all the difficulties.

SHEPHERD IVORY FRANZ.

COLUMBIA UNIVERSITY.

L'Asymétrie sensorielle. J. J. VAN BIERVLIET. Brussels, Hayez, 1897. Pp. 43. (Repr. fr. Bull. de l'Acad. roy. de Belg., Vol. XXXIV, 1897.)

This paper is an attempt to correlate right- and left-handedness with a functional preponderance of the same side in other senses. The evidence is purely experimental. One hundred subjects, mostly university students, were tested in the muscular sense, hearing, vision and touch. The muscular test consisted in pulling with each hand a load attached by a string. The load raised by the stronger hand remained unchanged and served as standard. In the first test, the two loads were started equal, and the one judged heavier was gradually decreased till it seemed equal to the standard. Another test was then made, with an ascending series of the variable weight. In all, three descending and three ascending tests were made on each subject, each with four different standards (500, 1000, 1500 and 2000 gm.). Of the 100 subjects, 78 were right-handed and 22 left-handed according to this test—none were 'ambidextrous.' With but two or three exceptions, the results when averaged were remarkably uniform, the ratio being about 450 gm. with the weaker, to 500 gm. with the stronger hand, whichever it might be; the same ratio held for the other weights.

For the sense of hearing, two shot-fall apparatus, almost exactly similar, were made, and each enclosed in a sound-proof box, with a tube running out to one ear of the subject. The two balls were dropped in rapid succession, and the subject compared the intensity of the sounds. For right-handed subjects the right ear was taken as standard, and the height of the left shot varied till the two sounds seemed equal; the procedure was reversed with left-handed subjects. Five series each were taken with increasing and decreasing intensity and averaged together. After a number of cases of partial deafness were thrown out, the variations of the rest were all in the same direction as the muscular tests, and the ratio almost exactly the same.

The visual tests consisted in measuring the distance at which type of a certain size could be read. Considerable difficulty was experienced from the various minor defects of vision, and many cases were out of all relation to the normal. Rejecting these, the difference between the two eyes, in almost all the rest, was again in the same direction and nearly the same ratio.

Finally, the tactile sense was tested by means of Weber's sensory circles. The author does not describe any means used to secure exactly corresponding regions of the two hands. Ten tests each were made in ascending and descending series. The right hand was found

to have a lower threshold than the left in right-handed persons, and *vice versa*, and the ratio was about the same as before.

In the muscular tests the ratio in question was 9.00 to 10 (right-handed) and 9.02 to 10 (left-handed); in the auditory tests 9.10 to 10 for each; in the visual, 9.08 to 10 and 9.04 to 10 respectively; and in the tactile, 9.06 to 10 and 8.93 to 10 respectively. The persistency of this fraction ($\frac{9}{10}$) seems remarkable, and should be submitted to further test; if verified, it will rank with the fractions determined for Weber's Law, or outrank them in importance. The uniform preponderance of the same side through the four senses tested is also notable. The author declares his belief that it points to an anatomical rather than a physiological basis for right- and left-handedness.

HOWARD C. WARREN.

PRINCETON UNIVERSITY.

ETHOLOGY.

Ethology: Standpoint, Method, Tentative Results. THOS. P. BAILEY, Jr., University of California. University Press, 1899. Pp. 30.

Bibliographical References in Ethology. THOS. P. BAILEY, Jr., University of California Library Bulletin, Vol. 13. University Press, Berkeley, 1899. Pp. 25.

This account of a new undertaking in the University of California is deserving of more than a passing notice. Here is a psychologist, a philosopher, and a student of education, devoting all his energies to the study of character. His title is inspiring: 'Associate Professor of Education as Related to Character.'

At the same time it is a commentary on the present condition in higher educational circles. Such a title would not be possible if our educational leaders recognized that the whole problem of education is one of character.

At the same time we feel obliged to protest against that view of psychology which finds it necessary to create a new science in order to make the study of character legitimate. True, the idea that psychology is unsympathetic, mechanical, lifeless, is abroad in the land, but that is not the view of our best psychologists, with whom the cry of 'Back to real life,' is strong and clear. We can assure our author that there are many psychologists who will welcome ethology as it is here outlined, as a new chapter in their own science, and that there are yet more who believe the sole aim of all branches of psychology to be the better understanding of mind with a view to its development.

This certainly is the belief which has given psychology its place in our colleges, and the one permitting the life of all psychology to-day in our own country. Experimental psychology, particularly, has grown upon it.

At the same time there may be no harm in giving this group of problems, the most important in all psychology, a special name, and assigning them to a special department in our University at least. There are people who will grant the reality of character and the importance of its study when they see it rechristened with a new Greek name. We expect help from Ethology in the University of California, but should not like to see a chair of Ethology in every college. We do hope that the work itself will be felt in every course in psychology in the country.

If the author finds it difficult to describe his new methods, the tentative results and the many lines of effort it certainly is impossible to reproduce them here, to say nothing of giving the criticism for which he asks.

The perspective drawing of a cave, with surface lines indicating lines of character growth, and cross sections showing successive stages of character development in the race and in the individual, and also corresponding stages in education from the Kindergarten to the University, is a helpful way to bring before the eye many of the elements which enter into character. It is, however, impossible to represent in this way the relative importance of the different elements.

Perhaps a place might be made for the influence of personality and for authority. This latter is suggested by the remark of a psychologist in a mission field—an excellent place for character study, by the way—that in their schools the discipline counted for more in character building than did all the secular and religious instruction. At the corresponding point in this diagram we see only the spontaneous development of boy nature under the influence of the various studies.

C. B. BLISS.

GENETIC, EDUCATIONAL AND SOCIAL.

Psychologische Analyse der Thatsache der Selbsterziehung. G. CORDES. Berlin, Reuther u. Reichard. 1898. Pp. 54. M. 1.20.

For the material of his enquiry Dr. Cordes turns to the experiences of his own life, stripping these as far as possible of all that makes them personal and unique, and dealing only with those aspects which are typical of the process in all men. The author's interest being a

psychological one, it lies as far from his purpose to enquire into the metaphysical possibility of self-education, on the one hand, as to make an ethico-pedagogical application of his results on the other.

By 'education' is to be understood the activity of one person—the teacher—which exerts upon another—the pupil—such enduring influence that his mental processes and outward behavior realize an ideal of thought and conduct existing in the mind of the teacher. Under this conception one can speak of *self-education* only by analogy, which is yet a real analogy, since here, too, an activity is found which exerts an enduring influence upon our psychical processes in consequence of ideals which exist in consciousness. To indicate the conditions and elements of this process is the object of the monograph, which can here be only briefly summarized.

At the outset two aspects of the matter present themselves: first, as to the presuppositions—the psychical material and means—of self-education; and secondly, the processes themselves which it involves. The presuppositions, putting aside disputes as to freedom or its contrary, and the possibility of self-observation, involve three things which correspond respectively to the personality of the pupil, the ideals of the teacher, and the educating influence which mediates between them. The whole complex fact of past experience and present character gives the first, in which, without following the detailed analysis of the writer, are to be separated the individual psychical acts and the personal disposition, whether resulting from these acts or due to inheritance. In the second place there must be set over against this, another order of psychical experiences, non-existent as yet for the practical subject, which consists of the ideals into which the present psychical processes are to be transformed. These ideals, derived from the lives of other persons either through indirect suggestion or generalized observation, become effective through the strong emotion with which they are conceived, an emotion depending upon a comparison of the two orders of experience with respect to their worth, and a resultant higher valuation of the ideal. The third of these presuppositions is the will for which this ideal order of experiences becomes a motive. The preceding judgment of worth is an effectless reflection which is energized by the will as a process of choice.

The second consideration is as to the actual processes of self-education. If one defines self-education as the shaping of the personal disposition so that each individual life-experience shall correspond to our highest moral valuation, then the general desire for betterment must be supplemented by a definite transformation of concrete indi-

vidual impulses if it is to be realized. This education takes place in three directions: First, with respect to intellectual processes, the whole order of ideas, concepts and judgments is to be shaken up and transformed; and these ideas and concepts, which possess each its particular emotional overtone, must be stripped of this overtone and united to a new quality of feeling. Secondly, with respect to emotional processes there are to be revalued under the criterion of the ideal order of experience the sensuous feelings, or emotional overtone of sensations, common feeling, by which is understood that fusion of inner and outer sensations in which our general well-being or ill-being is expressed, and the passions, through which not only are the ideas intensified, but they together with the will-processes are modified and transformed. Thirdly, with respect to the will-process itself self-education exerts a three-fold influence. First, in regard to the will's reaction upon motives, education is expressed in a more swift and decisive process; secondly, in regard to activity in general, it is expressed in an increase in the total will-power or energy of the subject; and thirdly, in regard to the voluntary direction of the attention, it is characterized by a greater control over the objects which shall occupy consciousness. The short bibliography which Dr. Cordes appends to his clear and detailed analysis would be of value if it were more precise. A general reference to Wundt's *Grundriss der Psychologie* or Nahlowsky's *Gefühlsleben* is too much like a wave of the hand to help in one's literary orientation.

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Über Willens- und Characterbildung auf physiologisch-psychologischer Grundlage. JULIUS BAUMANN. Berlin, Reuther u. Reichard. 1897. Pp. 86. M. 1.80.

In suggestive contrast with the introspective, theoretical work of Dr. Cordes (summarized in the foregoing note) stands this monograph of Professor Baumann, of Göttingen. The former is a subjective analysis of individual personal experience, the latter an objective study of the education of the will, the result of a life of personal observation as a teacher in the schools of Germany. The laws which Dr. Baumann sets down grew up as working principles in his teaching, and are intended to have a direct practical bearing. They are, the author tells us, a concise re-statement of ideas already set forth both in his *Handbook of Ethics* (1879), and in his *Introduction to Pedagogy* (1890), supported by the most recent results of physiological and pathological psychology.

We must distinguish between the will as theoretic choice and the will as psychological activity; in the latter sense it is expressed in a series of reactions and depends upon a psychophysical mechanism. With the development, educability and derangements of this will Professor Baumann here deals. The author refers briefly to the physical basis of mental life in general as indicated by the localization of brain functions, influence of drugs, effects of fatigue, and the like facts, then proceeds to a detailed statement of the physical relations which condition the will-functions, for the evidence of which he turns to the various phenomena of pathological will-conditions, abulias, amnesias and automatisms. It is through these interferences with the psychophysical mechanism by which the attitudes of the practical individual are expressed, interferences which pervert or inhibit his desires, that the conditioning of the will upon these processes is brought most forcibly to our notice. The undeveloped will is, then, that psychophysical organism in which the orderly connection of these parallel activities has not been established upon the basis of practical experience, and the pathological will is that in which the customary synthesis of perception or desire with motor reactions has been interrupted. The educability of the will depends upon the possibility of organizing and extending this system of coördinated physical and psychical activities, and the development of it consists in the actual process of transforming the elementary impulses and powers into such an orderly series of desire- and choice-fulfilling acts. In the child only the negative conditions of a willing subject are given. The vague discomfort is there, the vague desire, but the stimulation, whether peripheral or central, does not call forth, as in the adult, definite and adapted reactions. The capacity for reaction and the impulse toward original activity exist in the child but are not yet coördinated. In this coördination consists the education of the child-will. Professor Baumann next proceeds to an analysis of the chief psychological laws involved in the process of volitional education and the training of character, with especial reference to the development of moral qualities.

But first, since the healthy will involves a good mental tone and sound physical state, a fundamental condition of its training lies in constant care for the health and attention to exercise, rest and refreshment, both bodily and mental. The development of the will is twofold, corresponding to the active and receptive aspects of the personality: first, increase in the precision and energy of the will in those activities which we already possess; and secondly, extension of the will-activity to new objects and interests. The primary law of the

first form is practice; the activity in process of acquisition is established only through repetition, and the activity once under control of the will must never be allowed to lapse wholly from use. Spontaneous imitation the author is inclined to reject as an element in the education of the will, on the ground that it is only the realization of a tendency already existing, and is strictly limited in its functions. Voluntary attention is emphasized as a moment in the process parallel to the factor of repetition. To these must be added the influence of success and failure in effort, indirect training, example, emulation and the like, as factors in the development of the will. All these laws which condition the form of the individual will-act enter also, with their combinations, into the formation of character, that permanent disposition towards organized systems of activities which the individual act tends to beget, and from which reciprocally it springs.

Professor Baumann's monograph closes with a consideration of the pathology of mental and moral impulses, and a discussion of the theories of Beneke and Herbart concerning the education of the will.

ROBERT MACDOUGALL.

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L'Année Sociologique. É. DURKHEIM. Deuxième Année (1897-98). Paris, Alcan, 1899. Pp. vi + 596, 10 fr.

The two volumes now issued of this annual make a capital start. They are similar in scope to the *Année Psychologique*, having a Part I. devoted to *Mémoires originaux*, and Part II. given up to *Analysis* of books and articles published between July 1st of one year and June 30th of the next. Sociology is understood in the widest sense. The original memoirs are, for the most part, outside of our scope, but we may call attention to Professor Simmel's remarkable paper, in the first *Année*, on 'The Persistence of Social Groups,' now translated in the *Amer. Jour. of Sociology*, March, May, 1898. It contains much psychological matter on the different phases of so-called 'honor.'

J. M. B.

L'Évolution mentale chez les Animaux. CH. LETOURNEAU. Revue de l'École d'Anthropologie de Paris, Vol. 9, V., 15 May, 1899. Pp. 137-152.

This is a lecture delivered as an introduction to a course on the Evolution of Morality, at the School of Anthropology of Paris. In method and content the article is on purely evolutionary lines, and is divided into seven topics, as follows: The Problem of Consciousness.

Motivity, The Genesis of Desire, Sensation, Feelings and Emotions, Intelligence and Reason, and Domestication and Civilization. As a sort of summary of the development briefly traced under these heads, we may quote his words thus:

"At first, in the protozoa, we see only confused movements of the protoplasmic substance (*Amœba*). Then, in the lowest radiates, the nervous tissue begins to differentiate, to control the movements of the contractile substance, and even to be aware of sensations and to preserve a trace of them (*Medusa*). Among the higher radiates this nervous memory is perfected and from this there result complicated reflex acts, which seem combined, coördinated, for the attainment of an end, while being almost certainly unconscious. Organic and psychic progress is accentuated among the molluscs, where one sees plainly appear the organs of special sense, already well developed in the cephalopods. In the higher molluscs the relative perfection of the sense organs and of the nervous system, which, however, as yet ganglionic, authorizes admission of the existence of a well-developed nervous consciousness, of distinct sensations, of simple feelings, and even of an intelligence still rudimentary. Finally, in the divisions of the vertebrates, and particularly among the first of the mammals, the existence of mentality very analogous to that of man can scarcely be doubted."

Dr. Letourneau considers thought 'a complex product of nervous consciousness,' while reason he judges to be nothing else than "coördinated application of the elements of nervous consciousness to particular and desired ends."

GEORGE V. N. DEARBORN.

NEW BOOKS.

Psychologie mit Anwendung auf Erziehung und Schulpraxis.

KARL HEILMANN. Leipzig, Dürrschen Buchhandlung, 1899. Pp. 86.

L'Année Psychologique. A. BINET. 5^{me} Année. Paris, Schleicher Frères, 1899. Pp. 902. 15 Fr.

Wörterbuch der Philosophischen Begriffe und Ausdrücke. R. EISLER. Vierte Lieferung. Berlin, Mittler, 1899. Pp. 289-384.

Sensazioni vibratorie. N. R. D'ALFONSO. Seconda edizione Roma, Soc. Dante Alighieri, 1899. Pp. 39.

Through Nature to God. JOHN FISKE. Boston and New York, Houghton, Mifflin & Co., 1899. Pp. xv + 194.

Spinoza and Schopenhauer. SAMUEL RAPPAPORT. Berlin, Heyfelder, 1899. Pp. 148.

Nouvelles Esquisses de la Philosophie Critique. A. SPIR. Paris, Alcan, 1899. Pp. 30 + 147.

I Sogni, Studi Psicologici e Clinici. SANTE DE SANCTIS. No. 17 in Pic. Bibl. di Sci. Moderne. Turin, Frat. Bocca, 1899. Pp. 390. 5L.

An extremely well written and interesting account of dreams by a competent psychologist. The successive chapters sum up adequately the literature of the subject and give bibliographies under the several heads: *i. e.*, 'Dreams and Mysticism,' 'Methods of Studying Dreams,' 'The Dreams of Animals,' 'Of Children,' 'Of the Aged,' 'Of Adults,' 'Of the Neuropathic' (of several different classes), 'Of Criminals,' 'Dreams and Emotions,' 'Dream Psychoses in Health and Disease,' 'Psychophysics of Dreaming,' 'The Marvellous in Dreams.' An English translation would probably serve a good purpose. J. M. B.

The Philosophical Theory of the State. B. BOSANQUET. London and New York, Macmillans, 1899. Pp. xviii + 342. \$3.25.

The Races of Europe; a Sociological Study. W. Z. RIPLEY. With A Selected Bibliography of the Anthropology and Ethnology of Europe (a supplementary volume published by the Trustees of the Boston Public Library). New York, Appletons, 1899. Pp. xxix + 624.

This work comprises Professor Ripley's Lowell Lectures which have already attracted much attention in their serial publication in the Popular Science Monthly.

La Dissolution opposée à l'Évolution dans les Sciences physiques et morales. A. LALANDE. Paris, Alcan, 1899. Pp. viii + 492. 7 fr. 50.

Aberglaube und Zauberei von der ältesten Zeiten an bis in die Gegenwart. A. LEHMANN. Deutsche Ausgabe von Dr. PETERSEN. Stuttgart, Enke, 1898. Pp. xii + 556.

The Value of Religious Facts. J. H. WOODS. New York, Dutton, 1899. Pp. 165. \$1.

The Physical Nature of the Child and how to Study it. S. H. ROWE. New York and London, Macmillans, 1899. Pp. xiv + 207. \$1.

Friedrich Nietzsche, Aphorismes et fragments choisis. H. LICHTENBERGER. Paris, Alcan, 1899. Pp. xxxii + 181.

NOTES.

THE circular announcing the Fourth International Congress of Psychology has appeared. It may be had by addressing M. Pierre Janet, Secrétaire général, 21 rue Barbet-de-Jouy, Paris. The congress—of which we hope to make fuller announcement shortly—is to be held in Paris, Aug. 20–25, 1900.

OTHER congresses—to be held in connection with the Exposition—which may interest psychologists are: that for Philosophy, Aug. 2–7 (see circular of organization issued in the *Revue de Met. et de Morale*, July, 1899: another circular is in preparation giving an international 'Committee of Patronage' for this Congress), Secrétaire M. Xavier Léon, 39 rue des Mathurin, Paris; that for 'Instruction in the Social Sciences,' second half of July (having French organization and an international 'Committee of Honor'), Secrétaire M. Dick May, 22 rue Victor Massé; that on the 'History of Religions,' September 3–9, Secrétaires MM. J. Réville and Léon Marillier, Sorbonne, Paris.

WE regret to record the death, on June 14th, of Professor N. Grote, of the University of Moscow, the distinguished Russian psychologist and philosopher. Professor Grote was editor of the *Voprosii filosofii* and President of the Psychological Society of Moscow. The death is also announced (on June 13th) of Professor Nourrisson, the well-known academician and historian of philosophy.

PROFESSOR A. C. ARMSTRONG, JR., of Wesleyan University, is to be abroad the coming year on 'Sabbatical' leave, wintering probably at Oxford. The department will be in charge of Associate-Professor Dodge.

WE have received the first numbers of two new journals, the *Revue de Morale Sociale*, edited by L. Bridel, of Geneva (Paris, Giard et Brière, quarterly, 10 fr.) and the *Zeitschrift für Pädagogische Psychologie*, edited by F. Kemsies, of Berlin (Berlin, Walther, bimonthly, M. 8).

MESSRS. WILEY & SONS, New York, announce a work entitled *Statistical Methods with special reference to Biological Variation*, by Dr. C. B. Davenport, of Harvard University.

THE prospectus of the *Jahresbericht über Neurologie und Psychiatrie* has reached us. It is to be edited by Professor Mendel, of Berlin, with a corps of distinguished collaborators. The first volume will be devoted to the literature of 1897. Authors are requested to

send books and reprints for analysis to the publisher (S. Karger, Berlin, N.W. 6, Karl str., 15). A section devoted to Psychology will be in charge of Professor Ziehen, of Jena.

WE note the appearance of the German translation of Professor James' *Will to Believe*.

WE learn also that Professor Sanford's *Course in Experimental Psychology* is being translated into French by Dr. Schinz, and Professor Baldwin's *Story of the Mind* into French and Italian.

DR. W. O. MONTAGUE, of Harvard, has been appointed Instructor in Logic in the University of California.

PROFESSOR BALDWIN has been given a half year's absence from Princeton to see the *Dictionary of Philosophy and Psychology* through the press in England. He intends to sail on September 19th and wishes all the American contributions, proofs, etc., to be in his hands in the first week of September (address until September 10th, Buzzards Bay, Mass.). His London address is care Macmillan & Co., Limited, St. Martin's St. His courses at Princeton will be in the hands of Professor Warren.

AFTER the appearance of this issue all communications for the editor, books for review, etc., should be sent to Professor J. McK. Cattell, Garrison-on-Hudson, N. Y.

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